Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone, Sound Waves
PUBLISHED WEEKLY BY TELEPHONY PUBLISHING CORP.
608 S. Dearborn St., Chicago

H. D. FARGO, PRESIDENT AND TREASURER
S. R. EDWARDS, EDITOR AND SECRETARY

H. D. FARGO, JR., VICE-PRESIDENT AND ADVERTISING MANAGER
D. C. SORENSEN, WESTERN ADVERTISING MANAGER

Entered as second-class matter September 4, 1908, at the postoffice at Chicago, Ill., under act of March 3, 1879.

Volume 92
Number 8

CHICAGO, SATURDAY, FEBRUARY 19, 1927

Subscription — 10 Cents a Copy
$3 a Year U. S., Cuba and Mexico
$4 Canada, $5 Other Countries

RATES SHOULD YIELD A SURPLUS; MINNESOTA FINANCING PLAN

Whenever the revenues of a public service company are discussed now, it is taken for granted that its income must be sufficient to pay necessary operating expenses, a fair return on the money invested and to provide an adequate depreciation reserve. Under existing utility regulation the commissions in charge have come to consider these as fundamental requirements, and rates are adjusted to furnish the revenue needed.

In his annual report to the stockholders of the Lincoln Telephone & Telegraph Co., President Frank H. Woods made a statement that shows there is still another requirement that all well-managed companies should bear in mind. That is the creation of a surplus to carry the company through periods of depression and to provide for extraordinary emergencies that may occur.

* * * *

While it can be truthfully said that the telephone business is the most stable of industries, and is less subject to fluctuations than any other line of business, the suggestion is a logical one.

All commercial organizations, after paying operating expenses, interest and dividends, should be able to set aside an amount for surplus against the "rainy day." A depreciation fund is set aside to provide for the wearing out of tangible property. Why should there not be a financial depreciation reserve—the surplus—to guard against unforeseen and unavoidable loss in net earnings?

President Woods is a successful figure not only in the telephone business but in various other important lines of business, and he speaks from experience when he says:

"A public utility company must do something more than meet its requirements for operation, interest, dividends and depreciation. In addition to paying fair, reasonable wages to the men and women engaged in rendering the service, and in addition to paying fair reasonable wages for the capital making the service possible, these must be a margin.

"This surplus is necessary to carry the company through periods of depression and to provide against contingencies which, by the exercise of the utmost care, it is not humanly possible to forecast. It is essential in maintaining a financial standing that will enable the company to obtain, on favorable terms, the additional capital which an ever-expanding industry requires. Rates not providing a reasonable surplus are, therefore, unreasonably low."

* * * *

Under present regulation procedure, service rates are not fixed with any specific reference to the creation of a surplus. Payment of operating expenses, interest charges and a fair return on the capital invested are covered—at least theoretically—by the rates, but whatever goes into surplus is diverted from what otherwise would go to the stockholders.

They own the surplus by reason of their stock interest. Cases have been known where dividends were paid from surplus instead of from current earnings, in order to maintain an unbroken dividend record.

Good management, of course, will not continuously distribute every cent of earnings, but will lay some portion aside as surplus for less prosperous times. Mr. Woods is right, however, in declaring that rates that do not permit the creation of a reasonable surplus are too low. Rates should be adequate to allow for what might be called a "financial depreciation reserve" as well as for the depreciation account for tangible property which regulatory bodies insist upon.

* * * *

Announcement that a number of Minnesota Independent telephone men have formed a volunteer combination to safeguard the financing and operating of telephone companies in their part of the state is of unusual significance.

Jay Greaves, H. F. Lueders, P. M. Ferguson and their associates are successful telephone men who have made good records. They believe in the motto, "The telephone business for telephone men," and they propose to put that idea into practice for the purpose of preventing so-called "high finance" schemes from injuring the Independent telephone business in their territory.

Their professed object is to perpetuate the Independent telephone industry in the section it now serves, and keep it on a conservative, business-like basis.

The growing demand for telephone securities and the desire by outsiders to have a hand in financing telephone properties led to this action by the Minnesota operators.

When approached to sell their plants, or to enter into a plan for new financing, they conceived a new idea of the value of their properties, and naturally asked themselves the question: "If this business looks so good to an outsider, why isn't it just as good a proposition for us who are in the business and are familiar with it?"

* * * *

A little investigation showed them they could secure capital for extensions and improvements as well as others could; and this discovery confirmed them in the belief that they were in a good stable business worth of further development. Conferences among themselves on these matters led to plans for cooperation along the line of protecting mutual interests and strengthening the Independent situation in their territory.

Already this group has proved to its own satisfaction that there is ample capital at home to provide for the local companies, and they intend to see that telephone men remain in control of the telephone business.

If carried out as planned, such a program should improve the financial position of the companies involved, and be of permanent benefit to the entire telephone situation in Minnesota.

The Independent telephone industry has received a vast amount of publicity since investment houses and brokerage concerns have been showing a keen interest in their securities. Bond circulars, financial surveys and literature of various sorts have been widely distributed, boosting the telephone business as being fundamentally safe and essential and offering the investor a good return and strong security.

Such advertising is helpful and should assist service companies to obtain capital on the right terms to extend their business, but no pains should be spared by all telephone interests to confine the resulting financing operations within safe bounds. Conservatively managed, the existing active demand for telephone securities will be a big help to the telephone industry, but the fact should be constantly borne in mind that there is no speculative profit in the telephone business.

* * * *

Supplying telephone service is an essential, stable business whose revenues are established by regulatory authority, which, in the long run, is probably an advantage to those who are making it their life work.

COMING CONVENTIONS.

North Dakota, Bismarck, McKenzie Hotel, March 8, 9 and 10.

Oklahoma, Oklahoma City, Huckins Hotel, March 8, 9 and 10.

Texas, Fort Worth, Texas Hotel, March 15, 16, 17 and 18.

Kansas, Manhattan, Gillett Hotel, April 5, 6 and 7.

Iowa, Des Moines, Fort Des Moines Hotel, April 19, 20 and 21.

Ohio, Columbus, Neil House, April 27, 28 and 29.

Pennsylvania, Harrisburg, Penn-Harris Hotel, May 3, 4 and 5.

New York, Rochester, Powers Hotel, May 25, 26 and 27.

Great Britain's Telephone Cables

The Trunk Telephone Cable Network of Great Britain and Its Connection With the European System—Some Details of Cables, Their Operation and Maintenance—Submarine Telephone Cables Connecting With the Continent

By Col. T. F. Purves, O. B. E.,
Chief Engineer, British Post Office

The network of underground telephone cables for long distance communication which has now been laid all over Great Britain, and which, with the exception of a few minor spurs, came into full operation in January, 1927, fulfills an undertaking given by the Postmaster-General and his predecessors to provide in this country a telephone system which shall be free from interruption by storms and tempests and other physical causes of disturbance to which overhead wire routes, particularly when heavily loaded, have always been subject.

The accompanying plan shows the backbone routes of the main cable system. The numerous subsidiary cable networks connected with the main system are not shown, but it may be stated that all the principal commercial centers of the country are directly linked to the system.

Before the introduction into commercial service of the modern telephone repeater—first used in 1914 or thereabouts—the use of underground cables for long distance telephone service was limited to comparatively short sections, rarely exceeding 200 miles in length.

For such distances it was necessary to provide inductively-loaded conductors, weighing as much as 200 lbs. per mile (approx. No. 9 B. & S. gauge) to obtain efficiency comparable with that of open-wire lines. The use of cables of this class was restricted to the relief of over-loaded open-wire lines between busy centers in fairly close proximity to each other.

The effect of the general introduction of the thermionic valve repeater into commercial telephone service is well known. In the matter of cable design, it made possible the use of conductors as small as No. 19 B. & S. gauge (20 lbs. per mile) for long distance service.

The full-size modern main line cable as used in Great Britain has an external diameter over the lead sheath of about 2¾ inches and contains 44 quads of No. 16 B. & S. (40 lbs. per mile per wire) and 78 quads of No. 19 B. & S. (20 lbs. per mile per wire). The cables are almost invariably drawn into vitrified stoneware ducts; and the duct lines vary in capacity from 3 to 12 cables according to traffic requirement forecasts.

Loading coils are placed in brick or concrete underground chambers, which are spaced along the track at a standard distance of 2,000 yards. Three grades of loading are standardized as follows:

Millihenries per loading section.		Service.
Physical	Phantom	
44	25	4-wire circuits
89	54	4-wire and 2-wire
177	107	2-wire

All loading coils are of the compressed iron-dust core type.

Capacity unbalance is regulated by the cross-splicing method; and in the latest cables, owing to improvements in manufacturing processes, this unbalance is reduced to negligible magnitude.

Insulation resistance is maintained at a very high standard, the lowest resistance tolerated in practice being 10,000 megohms per mile; any resistance below that standard is reported as a fault and is dealt with

accordingly. This apparently excessive standard of insulation has proved in the practice of the British Post Office to be neither difficult to obtain nor to maintain. It has been rendered practicable by a highly-developed method of insulation testing, resulting from long experience with submarine cables.

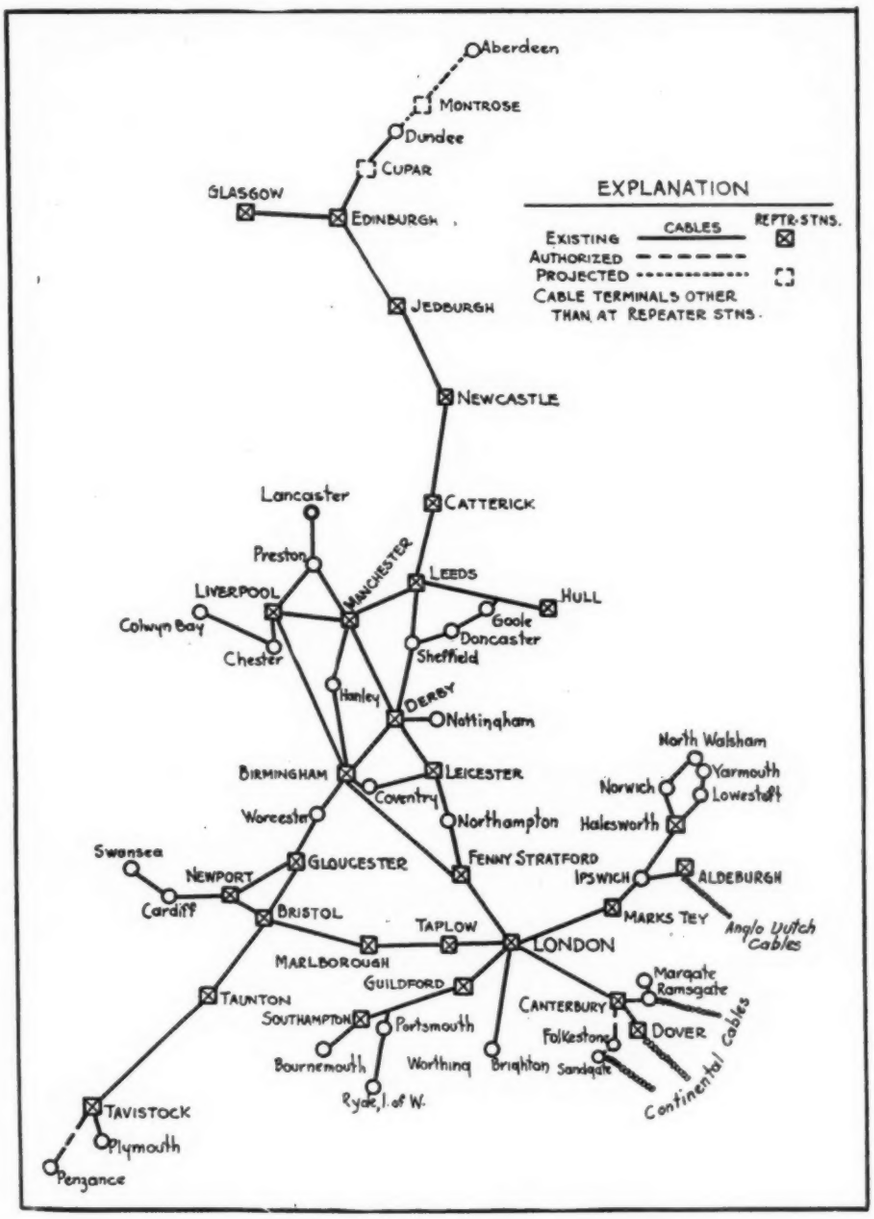
The location and removal of a "fault," showing a resistance of 200 megohms to ground, is not regarded as anything outside ordinary routine. Consequently, such defects as minute pinholes in the cable sheath are in many cases located and dealt with long before any inconvenience to the service could be experienced.

Repeater stations along the main cable duct lines are spaced at an average distance of about 55 miles.

The principal stations in the backbone cable have each a present capacity for 600 lines, and the buildings are so designed as to be capable of extension to the maximum circuit capacity of the duct lines, which at some centers approaches a total of 2,000 circuits. The power plant at all stations is so arranged as to be independent of public power supply in the event of breakdown; and where no public power supply is available duplicated prime-movers have been provided.

Each repeater station is equipped with a complete transmission test desk and with a high-grade cable insulation test set.

Great Britain is not alone among the European nations in the provision of telephone cable networks for long distance communication as a glance at the accompanying map will show. The cable network in Germany is now as complete as that in Great Britain insofar as it reaches all the principal commercial centers



Main Line Telephone Cable System in Great Britain; All Principal Centers of Country Are Directly Linked to It.

Col. T. F. Purves in This Article Gives an Excellent Presentation of the Telephone Cable Systems of Great Britain, Both Present and Proposed.

Other countries are busily engaged in similar provision and at no very distant date communication by long distance telephone cable will be possible between most of the important European towns.

The telephone system of Great Britain has been connected with those of France and Belgium for many years, the first submarine telephone cable between England and France having been laid as long ago as 1891. This cable, which is still in service, and those that followed it up to 1918, were of the four-core type, with gutta-percha insulation. In all, 13 of these cables have been laid, those of 1910 and subsequent dates being either continuously-loaded or coil-loaded.

To meet modern traffic demands and to insure efficient linking with the modern underground cable networks of Europe, a new type of submarine cable has been introduced.

In this type the conductors are loaded with fine iron wire to an inductance of 15 to 20 millihenries per mile and are insulated with paper and made up into quads and sheathed with lead. Over the lead sheath is placed a steel wire armoring, laid up and protected with jute in the ordinary method of submarine cable manufacture. Such cables are made up with four or seven quads and provide three circuits on each quad.

The first (four-quad) cable of this type was laid between England and Holland in 1924, and a second and similar cable was laid over the same distance in 1926. The length of these cables between landing points is approximately 80 sea miles. The circuit efficiency is about 16 TU. Each of these cables weighs about 20 tons per sea mile.

A seven-quad cable of this type was

laid between England and Belgium in August, 1926, and a similar cable will be laid between England and France early in the coming spring.

There will thus be provided 66 speech circuits in cables of the latest type between Great Britain and the Continent of Europe. As an example of the transmission efficiency obtainable under best modern conditions, it may be mentioned that the London-Berlin circuits routed via Holland are maintained at a standard level of 8 TU between terminal test boards, and that, since January of this present year, telephone communication has been available to the public from any town in England to any town in Germany.

Plans for 1927 include the extension of present telephone facilities to communication with the countries of Denmark, Norway, Sweden, Austria and Italy.

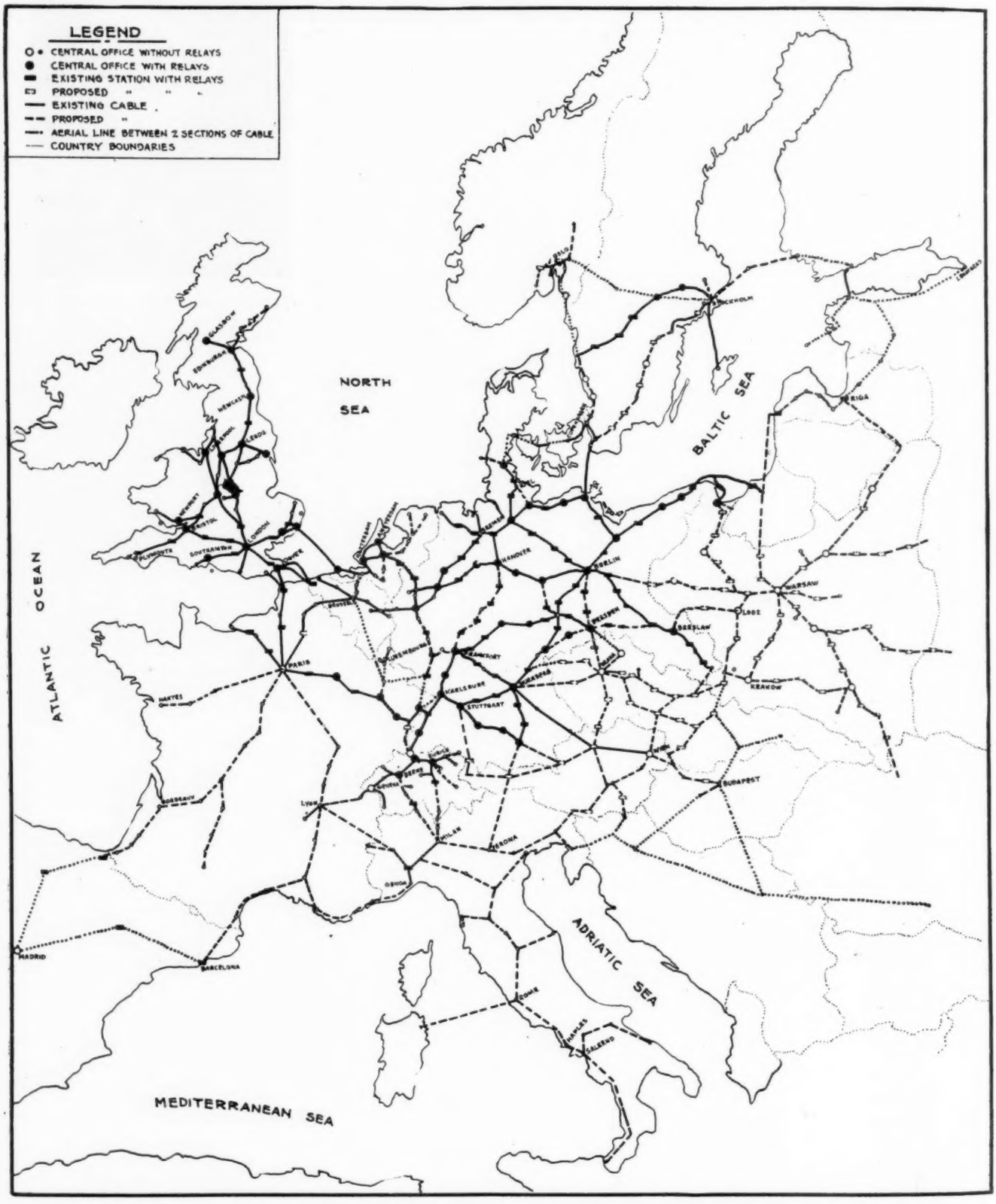


Diagram Showing the Proposed International Telephone Cable Leads in Europe; At No Very Distant Date, Communication by Long Distance Cable Will Be Possible Between Most of the Important European Towns.

Solving Interfering Tree Problem

Comprehensive Program of Ohio Bell Telephone Co. for Purpose of Informing Public of Service Deterioration Due to Tree Interference and Securing Their Cooperation and Educating the Employes in Tree-Trimming Methods

By Harry C. Hyatt,

Plant Supervisor, Ohio Bell Telephone Co., Cleveland, Ohio

The Ohio Bell Telephone Co. has adopted a comprehensive program for working out its interfering tree problem. After seven months of developing it and testing its possibilities, we are sure of its practicability and of our ability to carry it out.

An axiom of telephone operation could well be expressed, "that trees cannot properly develop and telephone wires properly function, in the same space at the same time." We all know that, but the general public does not. It is part of our work to educate the public as to why we have to trim interfering trees and remove hazardous ones, and to make them understand that trees planted under our wires can never mature as perfect trees.

The ordinary individual does not know that tiny leaves, wet with a summer shower, might make his message calling a doctor unintelligible. He does not think that a limb, falling in the wires in front of his home, may intercept a message that has successfully traveled thousands of miles. That is part of our work—making the public understand just that.

The public rightly would take this information with poor grace, if we, on our part, did not have something to offer in exchange for their understanding and the resulting greater leniency in granting the requests that we must make.

Our part is our promise to do all necessary trimming in accordance with the most modern methods that have been developed.

The rules of proper trimming are not so technical or complicated that they cannot be grasped and applied quickly and easily, and are equally applicable to your own shade trees and fruit trees at home.

It's really just as easy to trim a tree properly as to do it in a way that might arouse criticism, and proper trimming will lessen the necessary work of the future.

Throughout the state we have brought our men together in groups—those men, who, as our representatives, have a direct relation with the public in regard to its trees—to talk over the whole problem, and find out the successful ways of dealing with the public.

As part of these group meetings—schools if you wish to call them that—we are explaining standard tree methods and the underlying reasons for their adoption, by means of slides and talks. Employes of other telephone companies and of power and light companies were invited to attend and have signified their intentions of allying themselves with us in this important work.

In educating our men, we have held over 30 meetings. When that work is completed, the job will then be close supervision to see that the proper methods are applied.

Employes of other wire-using companies were invited to the group meetings because the public does not distinguish in the ownership of the wires and we feel that we should present a solid front of good tree-trimming work. They have shown a wonderful spirit of cooperation.

Harry C. Hyatt, a Graduate of Ohio State University in Horticulture and Former City Forester of Cleveland, Ohio, Is in Charge of Ohio Bell Company's Campaign Against Interfering Trees.

What we have termed our "Standard Tree Methods," which are to be followed in the field, have now been brought together in a booklet in a little different way, and in a little different form than heretofore. Two great power companies in the state have already had "Standard Tree Methods" reprinted over their names for their employes.

This is not a fad that the Ohio Bell Telephone Co. has inaugurated. It is not a frill that it has put on its maintenance bonnet. It is not merely a further step in the bettering of public relations. It is expected to be a solution of our interfering tree problem, a practical business proposition measured by the same scale with which our company measures all of its activities—results; and by results is meant perfecting of telephone service. It cannot help but improve our relations with the public.

We are using every means possible to present our problem to the public, including radio broadcasting. To indicate the type of matter presented to the public a recent talk by the writer, broadcast from station WEAO, Columbus, follows:

"It may seem somewhat of a surprise to you to hear a telephone employe talk to you about trees. Some folks try to create the impression that we are the relentless foes of trees; that we froth at the mouth and reach for our trusty ax when an unsuspecting tree looms up in the distance.

In times past, telephone and other wire-using companies have not given trees the consideration that they receive today. That cannot be charged to ruthless butchery, but rather to the unawakening of everyone in those times to the important part trees play in our daily lives. Twenty years ago, 10 years ago, there was not the general appreciation of trees, or the appreciation of any of the phases of natural beauty, that there is today.

If examples of poor trimming that was done 10 or 15 years ago are today seen on trees interfering with overhead wires, it is an example of the type of tree care that was prevalent at that time, whether done by corporations or private individuals. Knowledge of the tree processes, the correct methods of their care and, primarily, recognition of their beauty and value to the community are developments of these later years.

Telephone companies and their employes are striving for one purpose—perfect and economical service to the subscriber. Nature, as in so many commercial endeavors, seems to be trying her best to put every possible hazard in the way of attaining this goal. Sleet, snow, tornadoes, forest fires, falling trees, broken branches, lightning—and even old Aurora Borealis himself—are fighting against us, through all seasons, to do their best to lower our standards of service and increase the problems of good service.

If Nature and telephone companies are enemies, it is because Nature started the fight. The great utility companies have enlisted Nature's step-child, science, on their side; and through the research and development of the best minds of the world, Nature is being beaten, her battle lines are being pushed back—and it has been a fair fight!

The ordinary layman does not understand the caution and care that must be exercised, the constant patrolling of the lines, the replacing of equipment before it wears out, that are necessary to give the telephone service that the public have learned to expect and accept as a matter of course.

A living tree, owing to the liquid sap

contained in its leaves, branches, and trunk, is a conductor of electricity. When it is wet, from rain or melting snow, it is a better conductor; and touching the telephone wires, it steals from them a small amount of the tiny electric current that is necessary to carry the message. The normal amount is so minute that any drain on it, however small, makes a considerable difference in the quality and volume of the conversation you may be carrying on.

Tiny leaves, wet from a summer shower and touching the telephone wires, may make a message calling the doctor unintelligible to him. A limb, falling into the wires in front of your home, may intercept a message that has successfully traveled thousands and thousands of miles.

The "Blind Curve" Shown Below Was Made Safe by Ohio Bell Telephone Co. Employes by Removal of Brush Along the Roadside.

A Tree Like the One Shown Above Is Highly Valued by the Owner.

That's why we have to trim trees; that's why we sometimes have to cut them down. Every tree, that in falling could touch our wires, is a hazard to the successful completion of your message. Every tree growing up under our wires—every tree over our wires—is more than a hazard, an actual danger to the routine of your everyday life.

Most of you listeners are telephone subscribers—some of the 1,054,000 in this state—but those of you who are not are more dependent upon the speed, the accuracy, the convenience and the service of the telephone than are the subscribers.

You must get your ideas of neighborhood news from the newspapers; you must get your market quotations on stock or crops that you wish to buy or sell from the newspapers; you must keep up-to-date with the news of the day through the newspapers.

The news of the day travels over the telephone wires. The stock reports, the orders to buy and sell, the market reports from the various great markets that establish the prices of farm commodities, the business reports, the crop reports that establish the future farm crop prices—all pass over the telephone wires by Morse or code, simultaneously with telephone conversations.

Today, you pick up the paper and can tell to the penny what your cattle will bring, what eggs, apples, potatoes or any other product of the farm are worth; and the telephone wires *then* give you the opportunity to take advantage of the desired market conditions. The relaying of radio broadcasting, the transmission of pictures by wire—all pass over the telephone wires.

We are training our employes in the modern methods of tree-trimming; and we want you, who trim for us, to follow the same methods. Throughout the state, for several years past, we have made arrangements with the property owners themselves to do the trimming that is necessary for our wire clearance. Many of you are doing that work for us—because we feel that the work will be done to your own satisfaction—until now over 75 per cent of our work is done by the owner himself.

I want to urge upon you to balance up the tree when you trim it; don't hack off branches on one side and leave the tree lopsided. Don't leave great stubs for the start of decay and the entrance of insects; cut the branches close to the trunk or larger limbs. Paint the cut surface to more thoroughly protect it until the bark can grow over it.

I have told you how serious tree interference is to you and to us. We want you to refrain from planting trees under the wires, where they will grow up into our plant. Though the branches today do not interfere, next year they may; and five years from now they are sure to be up in the wires; meaning poor service and poor economy.

So it is the hope of companies using overhead wires, that individuals and organizations contemplating tree planting give consideration to this problem. Consider the service that you expect from the telephone and give it a chance.

Plant trees! Choose varieties that are suitable for the particular soil and climatic conditions. Plant them well, care for them, give them a chance to mature properly. Plant them away from the wires, so that, when they are old and perhaps decrepit, even in falling they cannot interfere with the telephone service of your children's children. That is the only fair way to treat the trees.

When telephony was in its infancy and paths were laid out for service development, the highways were followed to give to those pioneers, the service of the other pioneer—the telephone—for it was on the highway that they built their homes and lived. Today we follow the highway to serve you people living along them. The highways were not followed because of the trees, but in spite of them.

We wish to serve the greatest number of people. It is in that way that our service becomes more valuable to you; and it is in order to accomplish this purpose—to pick up these customers, who tomorrow you may wish to call, or they call you—that we follow the highways.

The attitude of the telephone company and its employes toward a tree is the same as yours. We appreciate its beauty as much as you do. We recognize that they give restful shade, relieve the monotony of the landscape, help purify the air of cities, and are real community assets that should be conserved.

We also know what you expect of your telephone. We know that twigs touching the wires destroy the secrecy of the telephone, that others may hear your message and you hear others until, if constant caution were not exercised, the telephone would have the utility of this radio—for general broadcasting only. They also make the telephone conversation unsatisfactory due to hums, noise and other disturbances they make on the lines.

We are arranging each day with the owners of trees for their trimming. We demand of our employes—and urge upon the owner who trims for us—that the modern methods of tree-trimming be employed. We encourage the planting of trees along the roadside—but so planted that the trees may develop properly; away from the wires so that they never can interrupt your service.

We assist in the removal of dangerous and decayed trees which tomorrow's wind may fall across the highways you are traveling. All of us are friends of the trees but first of all we are servants of the public.

We are appreciative of the opportunity that we have had, of explaining this part of our work to you. We hope that our requests will become fewer and fewer as the years go on, due to your cooperation, but we wanted you to know why we do have to come to you sometimes; we want you to have faith in the necessity of our requests and confidence in our expressed friendship towards the trees."

In announcing this talk, B. J. Coleman, who presides over the microphone at station WEAO, said:

"The next number is a talk by Harry C. Hyatt, a plant supervisor of the Ohio Bell Telephone Co. He is a graduate of Ohio State University and for five years was city forester of Cleveland, Ohio.

He comes to us tonight as an employe of the first great utility company to recognize the rights of the trees by having on its staff a man trained in tree work and looking at the problem from the standpoint of the tree and the owner. His talk will be 'Wire and Trees'."

"Human Equation" in Connections

There Must Be and Always Will Be a Certain Amount of Human Hands and Brains to Control and Guide the Wheels of Industry; and the Telephone System Is No Exception to the Rule—Operator Is "Human Equation"

By Miss Margaret Celeste Grace,

Traffic Chief, Fort Dodge Telephone Co., Fort Dodge, Iowa.

It was on the 10th day of March, 1876, that the telephone carried its first message—the first message carried over a telephone wire—and now there are 70,000,000 messages each day. What a wonderful record would have been handed down to the generations if there could have been a peg-count of all the messages that have come and gone over the great network of wires that circle and encircle this vast country.

Since time immemorial, it has always been the highest type of civilization that has been able to communicate with his fellow beings. The use of the spoken word for communication has placed man above all other created things, and the use of the telephone to convey the thoughts of one individual to another reflects, to a certain extent, his civilization.

It seems today that the means of communication is almost perfect—the splendid equipment of the finest types of switchboards, with all their modern devices; the excellent copper circuits stretching on mile after mile, yes, hundreds of miles, over the vast prairies, woodlands and crossing mountains, mighty rivers and lakes; the toll currents, amplified or strengthened by repeaters placed on certain circuits at certain offices along the trail, so that the voice of one party in conversation with another party in a far distant state, may be clearly heard.

In the year just passed, there has been the completion of a telephone cable reaching from New York City to St. Louis by way of Chicago. The island of Cuba is connected by telephones to the mainland of the United States through a submarine cable extending from Key West to Havana. And now Europe is telephoning every day to the United States by a combination of wire telephone and radio. That is the latest and most wonderful of the extensions of telephone communication.

And still, that wonders will not cease, the perfection of sending pictures by telephone has been accomplished, and now television looms as a possibility of not so far in the future. One of the first trials of telephotography, which proved successful, was the sending of a photograph of an operator in the Cleveland, Ohio, telephone office, to New York City.

On the 4th day of March, 1925, were the inaugural ceremonies in Washington, D. C. Just two hours after Calvin Coolidge took the oath of office that made him president of the United States, daily papers were sold in the streets of San Francisco, Calif., 3,000 miles distant, containing photographs taken during the ceremonies.

These are the results of some of the most wonderful feats of engineering the world has ever known.

But with all the splendid and wonderful equipment, there is a potent factor standing in between the machinery and the public served, and this is, and always will be, the human equation—the operator.

"This Is the Age of Specialists," Says Miss Grace, "and the Operator Is a Specialist in Her Line. She Must Specialize in Her Phrases, Her Voice, Her Codes, Her Etiquette; in Fact, Her Very Being, in the Profession."

In the early development of the telephone industry and communication, most of the way—yes, in all of the ways—the men and boys carried on. Girls and women did not enter into active duty—the operators were all of the masculine type. However, by careful observation and analysis, the boys proved to be inefficient: they lacked the patience necessary for this vocation. So they were replaced by girls, who thus far, have proved satisfactory, although now they are, in many places, being replaced by little "iron operators," or automatic switches.

Still there must be, and always will be, a certain amount of *human* hands and brains to control and guide the wheels of industry—and the telephone system is no exception to this rule.

And so, with all these modern and up-to-the-minute plant and wire devices, it is of the utmost importance that the human element be in keeping with the pace thus established by those modern means. With this taken well into consideration, the telephone field was never better for individual and clear-thinking minds than is the operators' field of duty today.

There is an urgent and demanding need for the girl who will put every nerve, muscle and sinew into her work; who will enter upon her duties each day with a clear, clean and determined effort to make good; who will use her mind for problems to be met and conquered; who will put away the "spirit of wanderlust" and will say: "I will stay here in my own little niche and make *my* telephone company the most efficient, courteous, and greatest in the world of telephony."

The field is large for the girl who will strive to make her company's service to stand out better than others, so that it may be said, "that telephone company at X gives the best telephone service in the country."

It is essential—it is vitally necessary to keep up with the mechanical achievements of the industry. The operators of today must do it. This is the age of "specialists," and the operator is a specialist in her line. She must specialize in her phrases, her voice, her codes, her etiquette; in fact, in her very being, in the profession.

To many, she stands as a pattern—an unseen statue—of what? The answer is this: She stands as the *telephone company* itself. For no matter how great the whole system is, how large a corporation or how small a company, the first, and many times the only, representative of that concern is the operator; hence, the company is judged by that first introduction of "Number, please?" and the efficient or careless manner in which calls are handled, information and long distance service rendered.

In one single connection, a voice may be carried through that single cord connection onto a toll line to the farthest corner of the continent, thus proving that the smallest task of the operator is as great as the whole system. There must be that intonation—that tone in the voice of the operator—going out to the patron, which will carry the impression that *she*, the operator, is there to serve, to help, and satisfy; for a satisfied subscriber is an asset to a company, and a dissatisfied one is a liability.

An operator must have intense interest and sympathy with her fellow beings, and

love for sincere and earnest work. It is so easy to say: "Oh, that Mr. Jones is an old crank and chronic kicker." True it may be so many times, but by a pleasing manner, a true effort to impress that very person with the thought that there is someone willing to go out of her way to help, will eventually soften or alter some of the chronic kicking, for to the operator is given a guiding hand (by way of the voice), and not a driving hand.

A rose bush growing in a garden, a stem of beauteous fragrant flowers, but clustered closely around those lovely blossoms are sharp briars and thorns that will hurt the tender and sensitive flesh for those who come in contact with them—there is a similar situation to that of the operator.

There are the pleasant and beautiful things to encounter and enjoy, the joy of duties well done, the feeling at the close of the day that one has done something to help a fellow being—these are the blossoms. Then there are the briars and thorns, constantly clustering around and hurting—the harsh, cruel words, the unjust mistakes charged to her—and unless these thorns are overcome and handled carefully, the beauty of the blossoms cannot be enjoyed.

Is there an operator who thinks, when she plugs in the jack or multiple in answer to the white light which gleams before her or the drop quivering down, that she is performing a service only for the two parties concerned—the one calling and the one called? No, she is not, for no one can tell how far-reaching or how many human lives are touched and affected by one little connection, thoughtlessly, carelessly, or earnestly and carefully made.

There is no business in all the world of industry where the efficiency of the whole system depends—yes, actually hinges—on the strength of each separate part, as the telephone system, or any group of workers who should realize the far-reaching importance of a connection or call, rightly or carelessly handled.

We are living in an age of big business and strong competition. Naturally, this reflects, or rather actuates, the telephone industry. With firms taking as their slogans, "Don't write—telephone," "Phone for food," and many other similar phrases, every door of big business is opening into the telephone field. It is not a back or side-door either, but a big, wide-open front door; and the operators, as hostesses of the telephone companies, must be there to welcome the guest with courteous, efficient, and hearty welcome.

It is to *her* the big job is given, for it is right here in the first introduction of the public to the company, that not only the brand of service, but the company itself, is "weighed in the balance," and whether or not that company is found wanting depends alone upon the operator.

There is another vital necessity to a good operator. She needs must be not only mentally fit, but physically fit also—and here is the reflection, for mentally and physically fit are dependent upon each other. So, she must have the proper food, proper exercise, plenty of fresh air, plenty of rest and recreation, and the living of a good, clean, moral life. These are the qualifications necessary for a 100 per cent operator in any office, large or small.

The mechanical apparatus is carefully inspected, batteries recharged, daily tests made of switches for the proper performance of the equipment—just so there must be the proper care of the *human* elements, if they are to be in the same class.

These things cannot all be realized by the operators alone—there must be the proper balance between the operator, the chief, and the executives. Enough stress, enough importance can not be placed upon the operator's position today, for she is the future executive in the telephone industry, and for this very thought, which must be considered by the ones higher up, great care should be taken in selecting new operators.

Will they meet the requirements? Is there material there to become 100 per cent? Can she keep pace with the equipment? The telephone industry is in its ascendency; so must everything and everybody concerned therein be also, for what has been accomplished in the past 50 years justifies the belief and prediction of an eminent telephone executive that "science will find a way to construct a telephone system that will connect the whole world."

The telephone operator, although perhaps not in such large numbers as today, will be the human element in the world's greatest communication—the telephone—and thus remain the human equation in the telephone conversation.

One of the greatest rewards to those who serve—is a kindly word of appreciation.
Building around this thought—and with the hope that by a careful study of other institutions of service we—The Home Furniture Company—may be of greater value to our community—there will appear each week our comment on one Fort Dodge Institution.
"Number Please?"
"Walnut 2265"
"Thank You"
—and in this most courteous way do the operators perform their work—for you and for us—day in and day out—making friends for the Fort Dodge Telephone Company. Nor does this courteousness stop at the switch-board but throughout the entire organization is that spirit to serve and with a smile.
Doubtless there are many business concerns who are their enviers—and our confession is—we are striving very hard to approach them in courtesy.
Fort Dodge Telephone Company—your efforts are appreciated.
HOME FURNITURE CO.

Newspaper Advertisement Recently Published by Fort Dodge's Most Progressive Retail Furniture Store, Indicating That the Telephone Operator's Courtesy Sets a Standard to be Followed by Other Business Concerns.

Different Program Planned for Kansas Convention.

L. M. Kraege, secretary of the Kansas Independent Telephone Association, informs TELEPHONY that the program of the annual convention to be held at the Gillett Hotel, Manhattan, on April 5, 6 and 7, will be unique and different.

Several good numbers will be obtained from the Kansas Agricultural College which is located at Manhattan. The operation of an automatic telephone exchange in a small town is also to be a feature of the convention and other interesting and helpful numbers are being placed on the program to make this convention a most successful one.

Automatic Telephone Fundamentals

This Is One of Series of Articles Explaining in Simple Terms the Mechanical and Electrical Basis of the Strowger Automatic Telephone System, Which Are Appearing Each Week in TELEPHONY — This is Part 8, Inter-Office Trunking

By Arthur Bessey Smith, Ph. D.

Automatic apparatus and circuits possess great facility for sub-division. Although originally designed for installation in one building, parts of the apparatus can easily be removed from the main office, installed at any convenient location, and connected to the rest of the apparatus by trunk lines.

The speed with which the subscribers may set up connections is unaffected by thus separating the various parts of the central office equipment. The total amount of apparatus is also nearly constant.

There is a practical limit of about 10,000 lines in one telephone office. This practical limit was formerly found in the nature of the manual switchboard, but does not exist in the case of automatic equipment. The increasing cost of long telephone lines is the barrier to large offices, which is unaffected by the type of apparatus.

It may be that if the telephone population is very dense, more than 10,000 lines might be handled in one office. It is certain that in the majority of cases a much smaller subdivision will pay. This subdivision has sometimes been carried to as small as 25-line units.

For the foregoing reasons the 100,000-line automatic exchange is necessarily a multi-office system. For illustration, we may divide the full exchange into ten offices of 10,000 lines each. Each office is complete within itself in that it possesses all the apparatus for completing any connection between any two of its subscribers. All of these ten offices are relatively equal as to trunking, so that no one of them deserves the title of "Main Office" more than the others.

A telephone exchange consists of the apparatus and lines for giving telephone intercommunication over a definite geographical area, within which one rate, or set of rates, is in force. An office is a switchboard installation with its appropriate housing. A telephone exchange may consist of one or more offices, and it will materially assist the reader if he will keep this distinction clearly in mind during the following discussions.

A single exception may be found in the case of the private branch exchange, a term which has held over from the days of single-office exchanges. Even here we may view it as an independent switchboard serving a firm or business house, and as being separate and distinct from the public exchange. When trunk lines are installed between a private exchange and a public exchange, the former becomes a private branch exchange. The present tendency is often to regard the P. B. X. as merely an office or sub-division of the public exchange.

In the 100,000-line automatic exchange, the first selector is the office chooser. Its sole function is to respond to the will of the subscriber in selecting the office to which the desired line is connected and to pick out an idle trunk line to that office.

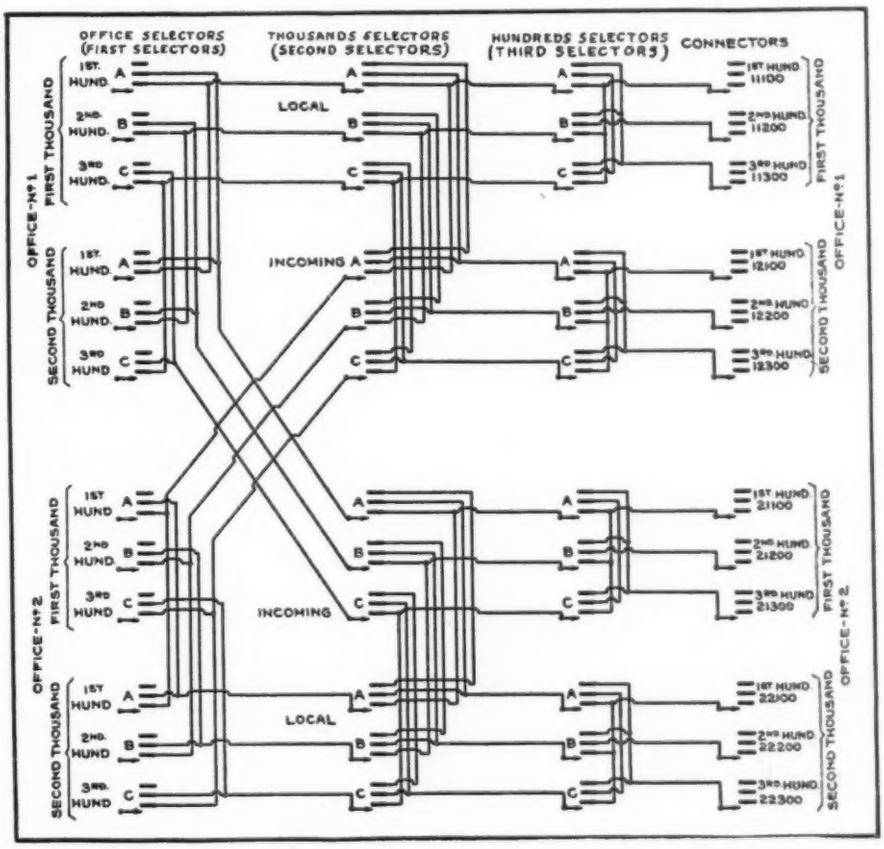


Fig. 28. Schematic Trunking Diagram of 10,000 Line Multi-Office System.

For this reason the first selector to be used is more correctly called "office selector." If in a large system it requires two selectors to choose an office, the first of them is called "first office selector," the second is called "second office selector."

The second selectors in each office are the choosers of thousands within the office, and are, therefore, properly called "thousands selectors." In this respect they perform the same function as that of the first selectors in the 10,000-line system, which has been described. The third selectors (hundreds selectors) pick out the hundreds and the connectors perform the final connection.

It will be noted here that two kinds of nomenclature for automatic switching equipment are in use in various parts of the world—one naming the ranks of switches in accordance with their order of operation, and the other in accordance with the nature or size of the group or sub-group they are required to choose. The greater tendency, however, is towards the latter; that is, the use of the terms "office selectors," "thousands selectors," etc.

Fig. 28 has been drawn to illustrate two offices of a 100,000-line system. Both offices are indicated by two of their thousands, and each thousand represented by three hundreds.

Traffic is delivered from the subscribers' lines to the first selectors by any means desired, either directly or through line switches. Just now we are not concerned with this part of the trunking, but will confine our attention to the flow of traffic

from the first selectors on to the connectors.

The trunks from all but one level of the office selector banks leave the office. For example, in Office No. 1, level No. 1 is carried through trunks to local thousands selectors in the same office. Level No. 2 is carried through trunks to "incoming" thousands selectors in office No. 2. In a like manner levels 3, 4, 5, etc., are trunked to offices 3, 4, 5, etc.

Taking office No. 2 as an example, the trunks from level No. 1 go out of the office to thousands selectors in office No. 1. Trunks from level No. 2 go to thousands selectors within the same office, since this is office No. 2. Levels 3, 4, and 5 are distributed to offices 3, 4, and 5 as aforedescribed.

There is no hard and fast rule for grouping the banks of the office selectors with regard to this trunking. In the illustration we have multipled like selector shelves together, as *A* to *A*, *B* to *B*, etc., but in practice the grouping is varied to suit the traffic conditions. This constitutes one of the points of flexibility to be found in automatic apparatus of this type.

Thousands selectors are of two kinds, "local" and "incoming." The local thousands selectors are those which take the traffic from office selectors in the same office. Incoming thousands selectors are those which take traffic from other offices.

The banks of the incoming thousands selectors are multipled into the banks of the local thousands selectors, because every thousands selector—whether local or incoming—must be able to reach any connector in the office. This multipling is done in such a way as to distribute the traffic as evenly as possible among the third selectors (hundreds selectors).

The inter-office trunks run from the banks of the office selectors to incoming thousands selectors in the other office. Hence, these are one-way trunks, because each trunk carries calls in one direction only.

The exact number of trunks per group is variable, but not exceeding ten, the number of contacts in one level. If the traffic is light, less than ten trunks may be installed, or a greater number of office selector switches may be connected into the same ten trunks.

The hundreds selectors have their banks multipled straight through the thousands to which they belong. They deliver the traffic to the connectors in exactly the same manner as was described for the thousands selector banks in the 10,000-line system.

The working of the system may be further illustrated by explaining the progress of a call. Let us suppose that subscriber 11225 calls subscriber 12342. The calling subscriber will use some office selector serving the first thousand of office No. 1. Let us suppose that it is one of the selectors on the "A" shelf.

The subscriber will first pull the figure "1" on his dial, which will lift the wipers of the office selector to the first level, after which it will rotate automatically until it finds an idle thousands selector on the "A" shelf in the same office. By pulling the figure "2" on the dial, this thousands selector will lift its wipers to the second level and then rotate automatically to pick up a trunk to an idle hundreds selector in the second thousand, which in this case will be on an "A" shelf.

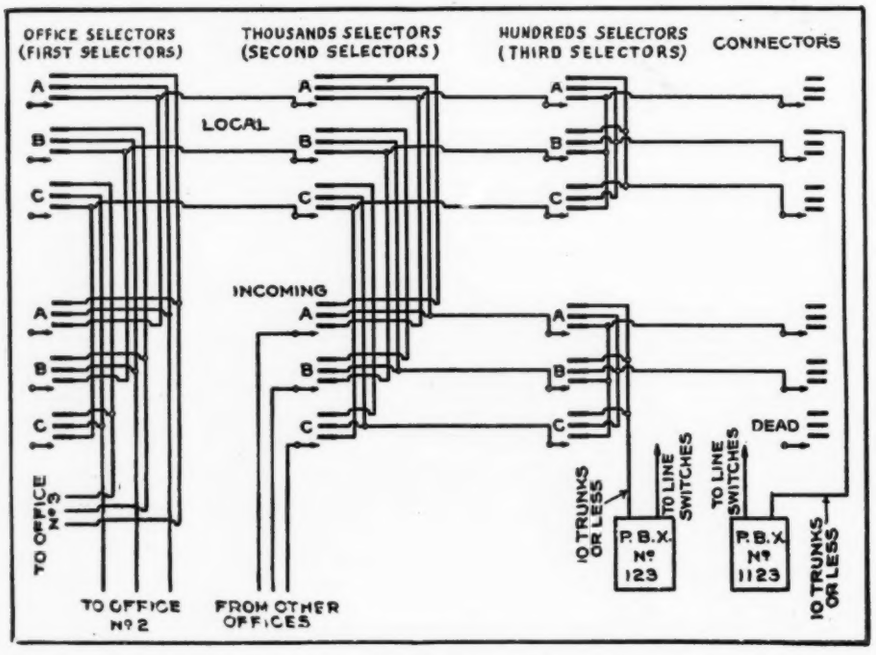


Fig. 29. Method of Connecting P. B. X's to Banks of Connectors on Hundreds Selectors.

Pulling figure "3" on the dial will lift the wipers of the hundreds selector to the third level, which will extend the connection to an idle connector of the third hundred of the second thousand. The connector will respond to the last two figures, lifting its wipers to the fourth level and rotating them to the second pair of contacts in that level.

If, on the other hand, subscriber 11225 had called subscriber 22342, the office selector would have been lifted to the second level and would, therefore, extend the connection through an inter-office trunk to an idle incoming thousands selector in office No. 2. From that point on, the establishment of the connection would be accomplished exactly as previously described.

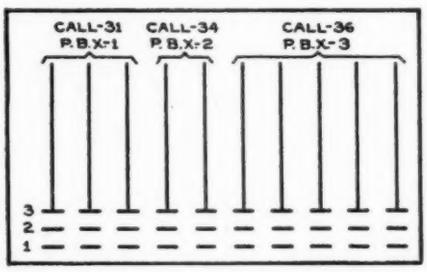


Fig. 30. Diagram Explaining the Arrangement for Automatic Selection of P. B. X. Trunks Taken from Connector Bank.

The private branch exchange trunks may be handled in two general ways, although a number of details may be varied, depending upon local conditions. (See Fig. 29.)

If the exchange has plenty of numbers to spare, the trunks to the P. B. X. may be taken from the banks of hundreds selectors, in which case the call number will consist of three figures. If we must be economical of our call numbers, the trunks will be taken from the connector banks and a four- or five-figure number be used.

If the trunks are taken from the banks of hundreds selectors, one entire hundred numbers are sacrificed for the sake of ten trunks to the P. B. X. This point will be seen clearly by reference to Fig. 29.

If the P. B. X. trunks are taken from the banks of a connector, the number of trunks taken will correspond more closely to the number of lines displaced. According to one system, one entire level of the connector is set aside for trunks to each P. B. X., which method is rather wasteful of space. Another and better method is to subdivide each level into as many groups of trunks as are convenient for handling the traffic to different P. B. X.'s. In this case the call number will consist of five figures.

To illustrate more completely the last-named variation, we will draw your attention to Fig. 30. The short horizontal lines will represent bank contacts on a connector.

P. B. X. No. 1 has three trunks, No. 2 has two trunks, and No. 3 has five trunks, making a total of ten trunks going from

the third level. The remaining levels are not shown.

When we desire to call P. B. X. No. 1, the tens and units figures of the call number will be 31. The impulses will lift the wipers of the connector to the third level and rotate to the first contact in that level. The connector will either seize that trunk or, if it is busy, move on over the group of three until it finds an idle trunk. If all are busy, it will stop on the last one of the group.

To call P. B. X. No. 2, the number 34 must be used. This will lift the wipers to the third level and rotate them to contact No. 4 in that level, after which selection will take place between the trunks of the group. The call number for P. B. X. No. 3 is 36.

In every case the connector acts exactly like an ordinary connector in lifting and rotating to a definite point, after which it rotates like a selector in picking up an idle trunk.

Trunks from private branch exchanges into the public exchange will lead to line switches, usually in the same hundred as that from which the trunks to the P. B. X. are taken.

(To be continued.)

Transatlantic Service to Chicago

Extension of Transatlantic Telephone Service to Ohio, Indiana, Michigan, Illinois and Wisconsin Signalized by Official Conversations from Cleveland, Fort Wayne and Chicago—Sir Alexander Roger Talks to Frank E. Bohn

Transatlantic telephone service was inaugurated between Ohio and the British Isles at 8:36 Wednesday morning, February 9. The first conversation ever held by a man from Ohio with another in London, England, was between Edwin F. Carter, president of the Ohio Bell Telephone Co., and H. E. Shreeve, a technical representative of the American Telephone & Telegraph Co., now located in London.

Simple ceremonies marked the extension of the new transatlantic radio telephone to Ohio. A group of 30, representing the telephone company and local newspapermen, gathered in the general office building of the Ohio Bell in Cleveland. Headsets were provided for all and when Mr. Carter put in his call they were adjusted and the company "listened in." Only a few minutes were required to complete the call; in fact, the time seemed unbelievably short before Mr. Shreeve was talking.

After Mr. Shreeve had said "Hello," Mr. Carter answered:

"Hello, Mr. Shreeve. This is E. F. Carter, president of the Ohio Bell Telephone Co., talking from Cleveland, Ohio. I hear you very well and so do all the people who are here with me at this early hour. It is just 8:36 here and some of the people in this room have not had breakfast yet."

President Edwin F. Carter of Ohio Bell Putting Through First Ohio Call to London, England.

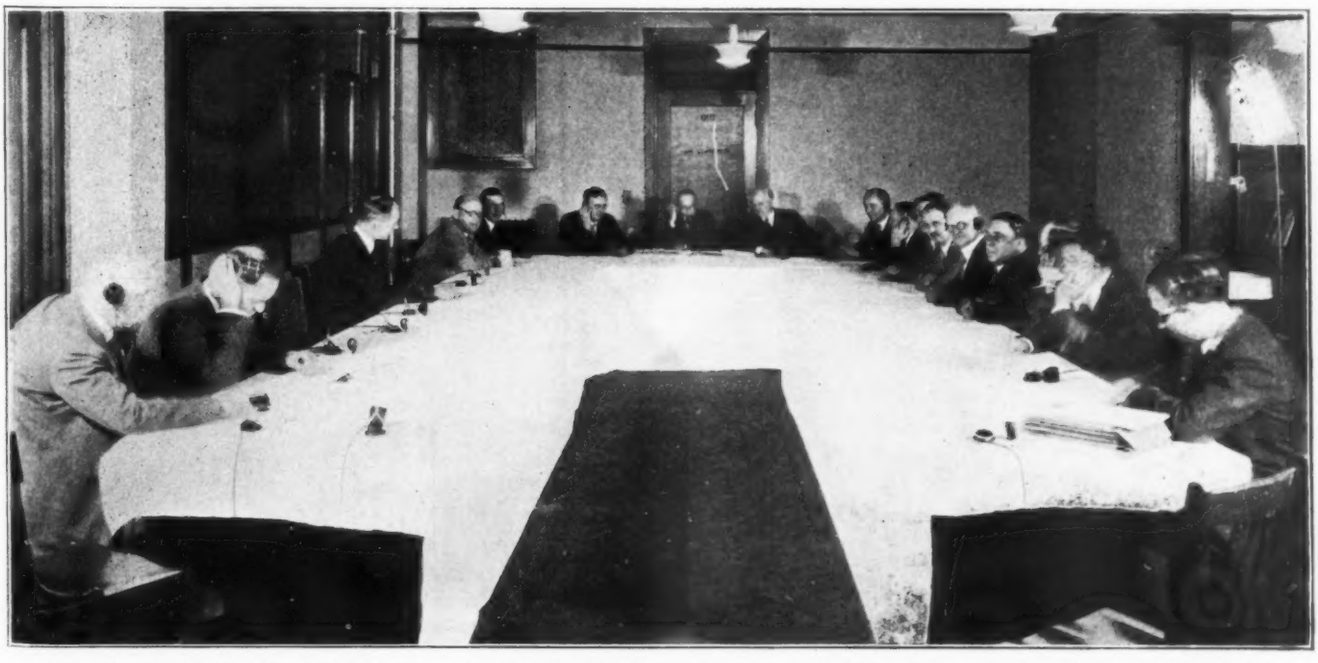
"Yes, Mr. Carter," Mr. Shreeve replied. "I recognize your voice and hear you very distinctly. It is now about six minutes past one, there being about six hours difference in time, and we have had our luncheon in London."

The Ohio Bell president then gave a set talk, in which he traced the development of Cleveland, the roads over which the first settlers came, and ended by saying that no matter the method of traveling or communicating, the human voice was carried at the greatest speed of all.

Following Mr. Carter's conversation, a Cleveland bank, a Cleveland mercantile company and a Cleveland newspaper talked to representatives in London.

Fort Wayne Talks with London.

The extension of transatlantic telephone service to include the state of Indiana occasioned a telephone conversation which



Group in Cleveland, Ohio, Listening-In to Conversation Opening of the Transatlantic Telephone to Ohio Points on February 9.

Fort Wayne Transatlantic Service Was Opened with a Conversation Between Frank E. Bohn and Sir Alexander Roger of the Telephone Development Association of Great Britain on February 10.

was held on February 10 between Frank E. Bohn, first vice-president and general manager of the Home Telephone & Telegraph Co. of Fort Wayne, Ind., and Sir Alexander Roger, head of the Telephone Development Association of Great Britain.

Gathered in the directors' room of the Home Telephone & Telegraph Co. to hear the conversation were Mayor William C. Geake and other city officials of Fort Wayne, President C. M. Neizer and the officers and directors of Home Telephone & Telegraph Co. together with other prominent business men of the city. Each chair had been equipped with a headphone, and all of those present were able to hear both sides of the conversation quite clearly.

The call had been scheduled for 11 o'clock, a. m., but due to several preceding calls being continued longer than the time which had been alloted to them, it was not until 11:30 when the operator's voice was heard saying, "All right, Mr. Bohn. All ready with London." The complete conversation was recorded by stenographers, and was as follows:

"Is this Sir Alexander Roger? This is Frank E. Bohn, vice-president and general manager of the Home Telephone & Telegraph Co. of Fort Wayne, Ind."

"Mr. Bohn, of Fort Wayne, Ind.?"

"I am pleased to greet you and congratulate you, as chairman of the Telephone Development Association of Great Britain, on the excellent work you and the association are doing to popularize the extensive use of the telephone in your country. Do you hear me?"

"Yes, Mr. Bohn. I wish to congratulate the United States on their enterprise in this matter, and to reciprocate your good wishes. I wish to inform you that we are installing the automatic telephone system. I want to ask you if your system was installed by Automatic Electric Inc. of Chicago, and do you find it satisfactory?"

"Yes, we find it very satisfactory, and the people of Fort Wayne are most pleased with the service and would not go back to the old manual service."

"We are installing the automatic system in London as quickly as we can. We expect to have it under way within the next six months."

"We are very glad to hear that. Fort Wayne has one telephone for every four people of our population, which is a very high rate of development, the country at large having one telephone for every seven people."

"I congratulate you upon this achievement. Would you like to speak with Mr. Moore, manager of the Automatic Telephone Mfg. Co. of Liverpool?"

"Yes, sir."

"Is this Mr. Bohn?"

"I am very glad indeed to have talked to you, Mr. Moore. I remember your being here some time ago. How are you?"

"We have to congratulate the United States for the development of the automatic telephone which we are installing in London."

"Thank you, sir. Now, I wish that you would give my regards to A. F. Adams of Kansas City, who is in London now."

"I surely will. Are you using Strowger automatic telephones, the same as we have in London?"

"We are using Strowger automatic telephones, the same type that you have in London."

"I will now let you talk to Sir Alexander Roger again."

"Hello, Mr. Bohn. I have before me

(*Please turn to page 29.*)

Chicago Celebrated Opening of Transatlantic Telephone Service on February 12 with a Conversation Between F. O. Hale, Vice-President and General Manager of Illinois Bell Telephone Co., and H. E. Shreeve in London.

AUTOMATIC

The C-A-X

utomatic Exchange)
ration saves money

cal operating labor
Automatic switches

ing the attention of
repairs, etc.), at the
ral exchange.

o replace a group of
in line construction
as well.

est kind of building
rs.

s the most efficient
ation for groups of

ctric Inc.

West Van Buren Street
A.

One of the following types of C-A-X's will solve your small exchange problem:

Type 15: A connector-per-line system, with a maximum capacity of 12 lines per unit. Uses existing magneto telephones equipped with dials. Dial-controlled code ringing.

Type 16: A 75-line common battery line-switch-connector system. Automatic code ringing up to ten stations per line.

Type 17: Same as Type 16 except for the addition of selectors, providing immediate facilities for expansion.

Type 18: A 75-line line-switch-connector system using existing magneto telephones. Automatic code ringing up to ten stations per line.

Type 19: Same as Type 18 except for the addition of selectors, providing immediate facilities for expansion.

Give us a few facts concerning your exchanges and we will be glad to submit further details of equipment especially adapted to your conditions.

More than 3,500,000 Strowger Automatic Telephones in service or on order throughout the world.

EQUIPMENT

When writing to Automatic Electric Inc., please mention TELEPHONY.

The Local Transmission Circuit Of The Strowger System

by H. C. PYE,
Research Engineer, Automatic Electric Inc.

(*Continued from last week*)

FROM the lineswitch the circuit leads to the selector switch. The connection here is also held entirely by auxiliary circuits, so that there are no attachments to the line whatever. This holds true also for all of the selectors in the train. It might be well to describe the selector bank construction here as all of the selector and connector banks are similar. The contacts are arranged in pairs with insulating plates between adjacent levels of ten pairs. The insulating plate is of such material and thickness that the capacitance between lines is very small even with many banks in the multiple. Ten of these levels are assembled together to make a complete bank.

Between adjacent levels, but insulated from the contacts, is a metal plate. This plate acts as an electrostatic shield for the contacts of each level and so balances the several capacities which are inherent in any form of bank construction that there is no cross talk. This construction, with its small units of small area and the absence of conducting plates, rods or wires of large area in close proximity to each other, is ideal from the transmission standpoint.

The banks are multipled by looping a twisted pair from bank to bank the same as in the lineswitch; in fact, this method of wiring is used for all multiples in the exchange because of the low cross-talk and transmission loss that is inherent in it. It might also be noted that the bank multiple wires are not tied together into a cable, but are left loose so as further to reduce the capacitance.

From the banks of the selector the circuit is extended to a repeater. See figure. The repeater supplies the current to the transmitter of the calling telephone when the connection involves more than one office. This eliminates the necessity of sending this current over the inter-office trunk from the connector, which would add a quite large resistance to the current supply circuit of the calling station. In a single office exchange, of course, the current supply would come from the connector. A nominal exchange battery voltage of 48 is used on Strowger equipment. This voltage makes it possible to supply the telephone transmitters with the required current for efficient operation over loop resistances much higher than is possible with lower voltages. A simple application of Ohm's law will demonstrate the advantage.

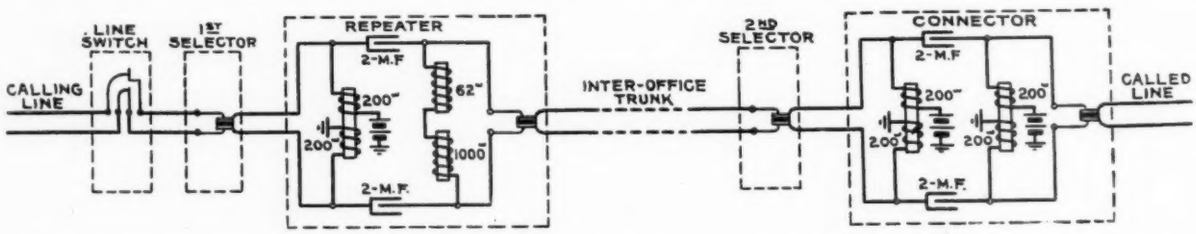
The line relay, through which the current is supplied to the telephone has had considerable attention as to design. It will be noted that its windings are divided into two sections on a common core. These sections are closely balanced and are so placed on the spool that there is a minimum of capacitance between the two windings. The winding and the core are so proportioned that they offer a very high impedance to currents of voice frequencies even when the core is magnetized by the direct current flowing through the windings. This is quite different from many telephone relays where cores are practically saturated by the action of the direct current which so lowers the permeability of the iron that the impedance to voice frequencies is greatly reduced.

Placing the two windings on a single core has a distinct advantage over the common practice of using two similar relays in series because the differences in the iron or the air-gaps in the relays may cause quite large impedance unbalances. The importance of the balancing of the relays will be realized when it is considered that even if the voltage induced in the two line conductors is equal due to the transpositions, there will be unequal currents flowing to ground due to the unequal impedances of the two paths to ground. The resultant of the addition of these two currents will be a current flowing around the line circuit which will be heard in the receivers, which is generally termed "line noise."

The talking circuit is carried through the repeater by means of two condensers of equal capacitance. These are usually of 2 M. F. each, but can be of higher capacitance if it is desired to reduce the loss to the very smallest amount possible. The outgoing side of the repeater is bridged by a high impedance relay which provides a path for the direct current necessary to hold the switches in the called office. This relay is of the same general type as the line relay, but because it does not have to supply current to the transmitter it can have a higher resistance. It is not connected to ground and therefore does not have to be balanced.

The connection continues over the inter-office trunk to the second selector in the called office, where the conditions are the same as for the first selector. From the banks of the second selector the circuit goes to the connector. The transmission circuit of the connector is similar to that of the repeater, the difference being that the connector is equipped with two identical relays for supplying current to the lines in either direction. The back bridge relay supplies battery for the called telephone in the same way as the line relay on the repeater does for the calling telephone. The line relay of the connector in the circuit shown here supplies current to the preceding repeater only for the purpose of holding the switches in the talking position. In a single office system the line relay of the connector would supply the current for the calling telephone and we would, therefore, have only one pair of current supply relays.

It is therefore seen that the Strowger transmission circuit is both simple and symmetrical. There is a minimum of shunt and series impedances, and those that are necessary are of such values as to cause the least possible transmission loss. The electrical symmetry of the circuit practically eliminates the possibility of cross-talk.



This is the final installment of No. 7 of a series of articles prepared by members of the Engineering Staff of Automatic Electric Inc., covering technical features of the Strowger Automatic Telephone System

(*Continued from page 24.*)

a map locating Fort Wayne. Isn't it wonderful that we are talking over 4,000 miles of land and sea? I want to congratulate you upon this American achievement."

"Thank you, sir. It is very kind of you to say so."

"Thank you very much for calling me up. Thank you. Goodbye."

"Goodbye."

The call was made by way of Toledo, Ohio, at which point it continued on the Chicago-New York transcontinental cable. Charges from Fort Wayne to London were $26 per minute, with a minimum call of three minutes. The conversation in this case lasted for six minutes.

Service Open to Illinois and Wisconsin.

The first official call in augurating the extension of the transatlantic service to Chicago was made shortly after 7:40 a. m. Saturday, February 12, by F. O. Hale, operating vice-president and general manager of the Illinois Bell Telephone Co., who spoke from the directors' room in the telephone building at 212 West Washington street, Chicago. Mr. Hale talked to Herbert E. Shreeve, in London. The first conversation was heard in Chicago by a group of telephone officials using extension receivers.

The telephone bell rang and Mr. Hale answered. "Ready with London, Mr. Hale." said the operator, and in a few moments came the voice of Mr. Shreeve over the 4,200 miles of wire and ether connecting the two speakers.

After an exchange of greetings, Mr. Hale congratulated the engineers of the Bell system and the engineers of the British Post Office upon the success of the achievement of transatlantic telephony. The circuit was then declared open to the public for regular commercial business, and the first of the calls, for which orders had been on file from the day before, was immediately put through.

Those present at the opening of the Chicago service as they appear in the accompanying photograph were:

Seated, left to right: L. N. Jones, general attorney; A. S. Hibbard, former vice-president and general manager, Chicago Telephone Co.; E. G. Drew, secretary; W. J. Boyd, treasurer; Stanley S. Holmes, Western Electric Co.; Frank Redmund, general plant superintendent; A. R. Bone, general commercial superintendent; B. S. Garvey, vice-president; F. O. Hale (at telephone), vice-president and general manager; W. O. Kurtz, chief engineer; H. M. Webber, superintendent, department of claims; S. J. Larned, general traffic superintendent; U. F. Cleveland, general auditor; Charles Barnett, commercial representative, long lines department, American Telephone & Telegraph Co.; C. W. Gelhard, supervisor of traffic, long lines department, American Telephone & Telegraph Co. Mr. Webber and Mr. Barnett are on the right-hand row, hidden by those in front.

Standing, left to right: H. W. Bang, assistant to president; W. E. Crosley, manager, health department; J. L. Spellman, publicity manager; A. T. Irwin, editor, Bell Telephone News.

The service to the states of Illinois, Michigan and Wisconsin began simultaneously with the Chicago opening.

The rate for a call between Chicago or any point in Illinois to any telephone in England, Scotland or Wales is $78 for an initial period of three minutes and $26 for each additional minute or fraction thereof. The length of conversation is limited to 12 minutes during periods of congestion and the transatlantic operator at New York will have charge of the connection and determine what, if any, allowance should be made on account of interruptions. The service from Chicago and other Illinois points starts daily at 7:30 in the morning and closes at 12 o'clock noon, Chicago time. On account of the difference of six hours in time, these hours correspond to 1:30 and 6 p. m., London time.

Federal Radio-Control Bill Still Held in Senate.

The senate on February 9, by a vote of 41 to 34, refused to send the conference report on the federal radio-control bill back to the conference.

This is the fifth victory the senate backers of the report have won in a few days, three points of order and two motions to recommit the bill having been defeated. It is uncertain, however, when the report will be voted on.

Senator Dill is confident of ultimate success for the report in the senate, and Senator Pittman and Howell, opponents, declare they are not filibustering, but only desire to convince the senate of the bill's defects.

Notifying the senate that by July 1 there would be more than 1,200 broadcasting stations on the air, with the result that ordinary receiving sets would be worthless except for the reception of local programs, Senator Dill announced on February 12 that he would move to take up the radio conference report in the senate as soon as the branch banking bill is disposed of late this week.

The motion to take up the report will be approved and will mean that the report must be considered as the unfinished business of the senate and not be subject to displacement. It is believed that debate can soon be exhausted and that the report will be adopted.

Cameron (Mo.) Company Bought by Middle States Company.

The property of the Cameron Telephone Co., Cameron, Mo., has been sold to the Middle States Utilities Co. of Missouri, over $100,000 being involved in the purchase price, according to newspaper reports. The Middle States company is the owner of a number of telephone systems in Missouri and Iowa. S. D. Thompson will continue as manager.

The officers of the company now are: M. L. Golladay, president; John A. Reed, vice-president; C. E. Richman, secretary, and S. D. Thompson, manager.

The Cameron Telephone Co. was organized in 1896 as a privately-owned enterprise by Ed. C. Baker and S. D. Thompson with about 100 telephones. In 1898 it was incorporated with a capital stock of $10,000. In 1909 the capital stock was increased to $35,000; and in 1918 it was incorporated for $75,000. The company now has over 1,600 telephones in use.

Changes in Ownership of North Dakota Telephone Properties.

The latest annual report of the North Dakota Board of Railroad Commissioners contains a list of utility property sales for the last two years. In this list are recorded the following transfers of telephone properties:

Northwestern Bell Telephone Co. sold the exchange at Pillsbury to C. G. Hilliard; the same company sold the telephone plant at Heil to A. E. Schulz; also to the Greaves Telephone Co., certain rural lines near Kenmare.

According to the record the Northwestern Bell sold an exchange at Barton during the last biennial period to John Brusven, and certain rural lines near Drake to the Guthrie Telephone Co. The Northwestern Bell likewise sold 12 miles of rural line to the Litchville Rural Telephone Co. and its exchange at Doyon to the Doyon Telephone Co.

The commission report also shows that the Overly Farmers Telephone Co. purchased from the Northwestern Bell its property at Overly. The village of Russell took over the local telephone plant from the Northwestern Bell.

The Knox Telephone Co. sold its property at Knox to the village of Knox. The estate of E. M. Fjelstad sold its telephone holdings to The Forman-Rutland-Havana Telephone Co. The Napoleon Telephone Co. sold its property to the Dakota Central Telephone Co.

H. L. Greaves sold the telephone plant at Bowbells to J. H. Ballard. C. F. Anderson purchased the telephone property at Lansford from the Northwestern Bell. G. H. Long sold the Deering exchanges to M. O. Stansberry. The Wells County Telephone Co. purchased a group of rural lines from the Northwestern Bell.

Pennsylvania Association Meeting Set for May 3, 4 and 5.

The 1927 convention of the Pennsylvania State Telephone & Traffic Association will be held in the Penn-Harris Hotel, Harrisburg, Pa., on Tuesday, Wednesday and Thursday, May 3, 4 and 5.

Quality in Program Service Systems

High Quality Reproduction in Program Service Systems Most Important Factor in Lasting Success—Excellent Discussion of Problems of New Service—Paper Presented at Convention of American Program Service Association

By Benj. Olney,

Engineer, Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.

A casual consideration of program service systems might lead one to the conclusion that the design of such systems is a radio engineering problem. Upon further analysis, however, we find that it consists merely in the application of telephone transmission engineering principles to the solution of a special problem in wire telephony.

It is true that we employ vacuum tube amplifiers and loudspeakers in these systems but, nevertheless, we deal solely with the same audio frequencies with which we are familiar in telephony.

The principal fundamental differences between program service systems and ordinary telephony from the transmission engineering standpoint are that in the program service system the volume level of transmission is much higher, and the quality of the reproduced speech and music much better than in ordinary telephony.

This brings us to a consideration of what is, in the opinion of the writer, the most important factor in the lasting success of any program service system, and that is—quality of reproduction.

High quality reproduction consists in the delivery of a copy of the original sound with minimum distortion and at a natural volume level. Let us discuss the first of these factors affecting quality. There are two kinds of distortion commonly recognized: Frequency distortion and non-linear distortion.

Frequency distortion results from the inability of a system to transmit all needed frequencies with the same gain or loss, while non-linear distortion is produced when the system itself introduces frequencies other than those fed into it. By careful transformer and circuit design, frequency distortion in an amplifying system can be reduced to an insignificant value.

Non-linear distortion, however, is always introduced when amplifying tubes are worked beyond their rated power output capacity, and results in the production of a series of undesirable high frequencies in the amplifier.

When an ordinary horn-type or a cheap cone-type speaker is used on an overloaded amplifier, the non-linear distortion is not strikingly noticeable except, perhaps, as giving a certain roughness to the tone, on account of the inability of such speakers to respond to high frequencies.

However, when a high-grade cone speaker that is capable of reproducing the high frequencies, which are so essential to naturalness, is used with an overloaded amplifier, the overload frequencies manifest themselves as a rattling, rasping "papery" sound in the speaker and, in most cases, make the reproduction unbearably harsh.

The foregoing is an explanation of why high quality cone speakers often appear to give poorer results than inferior horn speakers when used in connection with low grade radio sets. The fault is not in the speaker, but is due to amplifier overload and, were the same two speakers compared on an amplifier having adequate output capacity, the superiority of the cone speaker would at once be evident.

It is now desirable to make some statements with regard to the maximum undistorted output power that can be handled by certain amplifiers and amplifying tubes with which most of us are familiar.

We will not state this in watts or milliwatts because a specific knowledge of the actual power required to operate the loudspeaker is necessary in order that such data may mean much. We might say, however, that we have these data available and use them constantly in engineering calculations and measurements relating to amplifiers, as they form the basis of power amplifier design.

The No. 201-A type of tube, as ordinarily used, is incapable of driving even the smallest type of loudspeaker with reasonable volume without badly overloading.

The Western Electric No. 7-A amplifier is now obsolete for radio reception purposes and its output power is barely sufficient to supply one loudspeaker without overloading.

The Western Electric No. 6025-B amplifier is an excellent piece of apparatus and was designed to operate one loudspeaker at good volume and have a fair margin for overloading. It is capable of supplying two or three speakers at fair volume before overloading becomes very evident in a high quality speaker.

The No. 171 type tube with 135 volts plate battery will operate a loudspeaker at moderate volume without serious overloading, while, at 180 volts plate battery, the undistorted volume is satisfactory for home use.

These statements are made, not only as a result of listening tests, but are in accord with instrumental measurements and with engineering opinion among those engaged in the design and manufacture of the devices mentioned.

Now, in the practical design of program service systems, it has been necessary to make some compromise in volume level, mainly on account of cross-talk difficulties. We would like to be able to deliver at each subscriber's station, volume which closely approaches that of the original sound, as this would produce a more complete illusion of naturalness. The voltage that may be transmitted along pairs in working telephone cables is, however, quite definitely limited by cross-talk to the telephone circuits.

This may be minimized by proper circuit design and by choice of a suitable value of speaker impedance but nevertheless, is the controlling factor affecting the volume level. This limitation could be done away with if the rates obtainable for the service would justify installation of a power amplifier at each subscriber's station but it does not seem that the latter course will be followed, except in certain isolated cases.

As an illustration of the latter, it may sometimes be desirable to provide music in a small hall or in a restaurant. In such cases, a local power amplifier and large loudspeaker may be used to produce the necessary volume without employing greater than normal voltage on the cable pairs.

Granted, then, that in systems which distribute through telephone cable we must be content with somewhat less than natural volume, there remains all the greater

Experience a Factor in Advancement.

Advancement in business depends to a great extent upon the ability of the man to grow and to learn by experience. The trouble with many men, I find, is that they are unwilling to learn and to get experience. When they learn one job they are willing to stay at it, for it is undoubtedly easier to do a thing which has been thoroughly learned than to learn a new thing.

The chances for a young man in the public utility industry today are at least as great as they were when I started. And the need for men who are thoroughly grounded in the practical side is tremendous.—M. S. Sloan, president of the Brooklyn Edison Co.

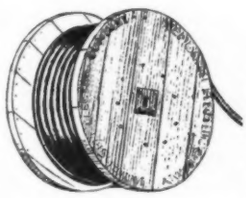
THE GRAYBAR TAG SYMBOL OF DISTRIBUTION

One year old — 58 years in business

A YEAR AGO Graybar Electric came into existence—and with it the Graybar shipping tag.

But behind company and tag were more than half a century of experience; first as Gray and Barton, later as the Western Electric Supply Department, distributor of everything electrical.

Sixty thousand items are the sum total shipped under the Graybar tag—the symbol of a distributing service that operates wherever electricity lightens burdens, speeds up work or increases comfort.



Take lead-covered cable for instance. Here is another of Graybar's 60,000 supplies — electrical supplies whose high quality is supported by Graybar's 58 years of experience.

Offices in 59 Principal Cities
Executive Offices: 100 East 42nd St., New York

GraybaR

Successor to Western Electric Supply Dept.

Electrical Supplies

THE GRAYBAR TAG UNDER WHICH 60,000 QUALITY ELECTRICAL SUPPLIES ARE SHIPPED

When writing to Graybar Electric Co., please mention TELEPHONY

reason why the quality of reproduction otherwise should be as good as can be obtained. This means that frequency distortion must be reduced to a minimum by careful circuit and transformer design, and that no amplifiers in the system may be more than very slightly overloaded.

It is also required that the loudspeakers be of comparatively low impedance, not only that the line voltage may be kept below the cross-talk level, but also that cable capacity may not be effective in shunting high frequencies away from the speakers and thus impairing quality.

The speakers must, of course, be sensitive and be capable of responding to a satisfactorily wide range of frequencies, as care in the amplifier design is wasted unless the electro-acoustic devices employed are of the highest class.

In the design of a practical system, we have chosen to limit ourselves to the use of the No. 171 type of output tube, as those of greater power capacity require such a high plate voltage that their operation, without special and complicated safeguards, is contrary to underwriters' rules.

Number of Loudspeakers on Line.

By using two such tubes in parallel, in each of the final amplifiers, it is possible, under average line conditions, to supply 10 loudspeakers with all the volume that may be had without cross-talk and without overloading the amplifiers.

The average line condition here considered assumes that five cable pairs of 300 ohms' resistance each are multipled to the output terminals of the amplifier and the 10 speakers are distributed in pairs on the ends of these lines. The speaker employed in this system has an impedance of about 500 ohms at 1,000 cycles.

With proper design of the transformers associated with the amplifiers, such a system gives excellent quality. If the line conditions are less severe, more than 10 speakers may be served by each amplifier at the same volume level and without amplifier overload.

It is, of course, possible to connect an excessive number of speakers to an amplifier and, by increasing the amplifier input signal, keep the volume at the usual level. However, this is bound to result in amplifier overload, and the consequent nonlinear distortion will quickly be noticed by subscribers who have been accustomed to high quality reproduction.

In systems where it is possible to use open-wire distribution, preferably No. 10 gauge copper, line loss and cross-talk may become negligible factors and a larger number of high impedance speakers per amplifier may be employed.

With amplifiers equipped with modified output transformers, but otherwise the same as described in connection with the cable distribution system, our calculations show that it should be possible to operate up to 25 speakers on an average No. 10 gauge copper exchange line and maintain the same volume and quality as in the cable system with 10 speakers.

We realize that the amplifier load capacities we have stated in this paper will seem ridiculously low to those who may be operating 50 or more speakers at fair volume level from a Western Electric No. 7-A or a similar amplifier.

It may quite easily be demonstrated that, under this condition, such an amplifier is being grossly overloaded, and it is reasonable to inquire why the reproduction in such a system is even bearable. The reason is that the characteristics of the system are such that the high frequencies are cut-off.

As we have said before, overloading an amplifier produces in its output a series of high frequencies which are not present in the original sound and, therefore, introduces distortion of a most disagreeable type. It follows that, if the circuits and apparatus are such that these high frequencies are greatly attenuated, the resulting distortion will not be as apparent as in a system which will reproduce a wide frequency band.

However, it is a well-recognized fact that a system which will eliminate entirely these overload frequencies will also eliminate from the transmitted energy those frequency components which contribute to the naturalness and clearness of the reproduced speech or music, and the resulting reproduction will not be comparable in quality to that given by a well-designed system in which the amplifiers are not overloaded.

If the suppression of the higher frequencies is not fairly complete, such an overloaded system will give harsh, rasping reproduction in high quality cone speakers, while, if the suppression be quite complete, speech will be muffled, drummy and difficult to understand, and music will be so mutilated that some of the higher-pitched instruments may not be reproduced at all.

If ordinary horn speakers are used, both the high and the low frequencies will be suppressed and, although the overloading may not be so apparent, the reproduction will be far from satisfying.

Quality Judged by Hearing Sense

In discussing quality of reproduction, we are dealing with something which is not directly measurable by instruments, but which must be judged by the sense of hearing.

It is an established fact, well recognized among those engaged in studies of hearing, that we may accustom ourselves, by frequent listening, to certain types of distortion until we lose some of the sensations of unnaturalness and may even become fairly well satisfied with such reproduction. This condition may continue until one of two things occur.

Someone who is familiar with high quality reproduction may point out to us certain prominent defects in the speaker rendition. Then, we unconsciously begin to listen for these defects at every opportunity until finally they become so evident to us that we are no longer able to enjoy the programs.

In the second case, we may have the opportunity of making a more or less direct comparison between high quality and distorted transmission. Under these circumstances, even ordinarily undiscriminating listeners are quick to become dissatisfied with the distorted version.

The foregoing discussion leads us directly to a consideration of the vital necessity for maintaining as high a standard of quality as possible in program service systems.

If it were necessary only to compete with the average cheaper radio receiving set of today, a high standard would not be required. At the present time, however, there are on the market a few receiving sets of the better grade which, when equipped with the correct vacuum tubes and properly operated in connection with a good cone-type loudspeaker, are capable of very good reproduction.

As a matter of fact, the most distortionless program service system which we can design to operate through telephone cables without employing subscribers' station power amplifiers, cannot produce as natural reproduction as the best of these receiving sets because of the limitation

It Pays Companies to Have Employes Read "Telephony."

"We have been a subscriber to TELEPHONY for years, and also take three copies for our employes, for we do not want them to be without it."

This statement is in a letter from James McBane, manager of the thriving Bergholz Telephone Co., of Bergholz, Ohio.

In a letter dated January 12, W. S. Daniel, secretary of the Winona Telephone Co. at Knox, Ind., which operates eight successful exchanges, writes:

"Enclosed please find check for six subscriptions to TELEPHONY for the year 1927. TELEPHONY to us is very interesting and instructive, and we would miss it much if we had to do without it."

Both the Bergholz and Winona companies are pursuing a wise course in seeing that their employes keep posted as to telephone developments by reading TELEPHONY every week. Mr. McBane and Mr. Daniel have found it pays to supply the members of their staff with a weekly journal that aims to help all engaged in telephone work.

The company that gets the best service from its employes is the one that shows a disposition to cooperate with them in ways that are worth while.

In this swift-moving age the successful business organization is the one that keeps up-to-date on the developments in its field. That is what TELEPHONY does in the telephone field every week.

upon volume imposed by cross-talk requirements.

As manufacturers of a high-grade receiving set, our company is constantly pursuing research and development work in an endeavor to improve our product.

We believe, also, that we are in unusually close touch with radio and allied developments through contacts which members of our organization enjoy with various trade and engineering bodies. For instance, our chief engineer, Mr. Manson, is chairman of two important committees on radio and electro-acoustical apparatus in the National Electric Manufacturers' Association, and the Institute of Radio Engineers, and is a member of four other committees which deal with advisory and standardization work in the communication industries.

As a result of our own research and of these associations, we may say that even further improvements are to be expected in high-grade receiving sets and loud-speakers along the line of high quality reproduction and that the cheaper grades of apparatus are, in time, bound to follow along the same course, if they are to survive.

As you probably know, there is considerable development work being done by powerful interests on program service systems in connection with electric light and power distributing lines. We have reason to believe that there is good engineering talent behind these systems and that anything which they produce will be capable of delivering high quality.

Such systems are sure to come and any telephone program service company which cannot give as good a grade of service has to face the possibility of having its territory invaded by a competitor having a powerful advantage.

There is also the possibility that, with the continued growth of service, program systems may be placed under the control of public service commissions having jurisdiction over rates and the quality of programs. This is another strong argument for preparing to give the best class of service.

A telephone company in this day would not consider the purchase of telephones and switchboards which were defective from a transmission standpoint because of the possibility that toll line systems might, therefore, object to connecting with them.

This condition may come to have a parallel in program service work if, at some time, programs are sent over telephone toll lines, and the local company with poor quality equipment would be at a decided disadvantage in applying for connection with such a system.

These are some of the problems which program service systems will have to meet. We believe that you, as telephone men, will see the importance of planning for the future in the design of a program service system, as you would in the design of a telephone plant.

It is essential that the equipment should be capable of giving the best quality of reproduction which is economically practicable, otherwise the service cannot survive competition with the coming radio receivers. Also, it must be built with regard to durability and to the possibility of future expansion, the same as a modern telephone switchboard.

In conclusion, we believe it is not reasonable to expect that a system comprising a variety of apparatus, not originally intended for such use, will possess these qualities to the fullest extent. They will be found only in systems which owe their existence to the careful application of established engineering principles.

IDEAS

By Miss Anne Barnes

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

There are doubtless few people who have not read that most pathetic story of the poor little match girl who burned her matches one bitterly cold night in an attempt to keep from freezing; and as she looked at the tiny glows of warmth, of how she saw visions of shelter, food, and comforts such as she had never known.

I suppose, as she stood there night after night trying to sell her matches to rich people and poor people, kind people and harsh people, she built thought castles, even as you and I, who are so much better off.

Of course, there was not a chance in this world for her to realize any of her thought castles, but I like to believe, on that last night while she burned her matches, that her visions came true.

I am wondering, tonight, about you and me. We dream dreams, build thought castles, and long for their realization. And that is about as far as we get.

What is more useless than a match until we light it? What is more useless than a good idea which lies dormant in the back of one's mind?

So many times this is said to me by chief operators who attend conferences: "Don't call on me to talk. I came to get all the ideas I can, but I don't want to be called on."

"What a pity it is," I think, "to hold back a good idea just because one does not like to talk in a conference."

How many good, helpful ideas are not expressed because people dislike talking in conferences. Perhaps the very ones who could make a conference a success sit silent.

I often think, if everyone came to a conference just to get good ideas and to contribute none, how little it would pay them to come in.

I read a story about a young man who was so dissatisfied about his progress in work that he consulted an expert advisor to find out why other men in the company were advanced while he seldom received a promotion.

The advisor asked him if he could make any suggestion to his employer by which sales could be increased $5,000, $500 or $100 a year.

"Don't answer me now," he said. "Come back in one month with your answer."

The young man returned in one month and admitted failure.

Then the advisor told him that if, after being employed so many years in such an enormous business concern, he was not able to give his employer one single idea that would save so small an amount as $100 a year he was a liability to his company.

MORAL: If you give me a dollar, and I give you one, then we shall each have one dollar. But if I give you an idea and you give me one, how many ideas will we each have?

If each one in a conference contributes an idea and each one goes back home with her own idea plus all the other ideas, it looks to me as though there will be a crop of promotions.

Sundry Snapshots Along the Trail

Observations and Comments, Pertinent and Otherwise On the Sunshine and Shadows of Telephone Work

By Well Clay

Each day I see a town to be
  Grown from our town today,
But an older town dwells in my memory;
  The town that has passed away.

This new town will be a good town,
  Better than the one today;
As our town is a better town
  Than the town of that other day.

The new town is a brighter town
  Than the town we live in today;
With finer streets and better marts
  And bigger in every way.

Our old town was a good town
  As any town of its day,
But our present town is a better town;
  None will hesitate to say.

So let's not forget the old town
  Nor its builders who have passed away;
And let's all pull for the new town,
  The town of our children's day.

If late reports are true—and there are 90 per cent of the Independent telephone properties in the United States being operated by managers of long experience—it would seem to prove either, once a manager gets his tentacles fastened that it is impossible to pry him loose, or that he is managing the company in the proper manner to give satisfaction to both the patrons and the stockholders, and they won't let him go.

It also follows that if the managers are mostly veterans, they have for the greater part been with their respective companies while their communities have grown from small towns to bigger towns and are looking forward to seeing them still bigger and better in the future. They have seen a majority of their present patrons grow up or move in, and they are sort of a

"He Is Managing the Company in the Proper Manner to Give Satisfaction to Both the Patrons and the Stockholders."

connecting link in the knowledge of who is who and who used to be.

As one manager put it: "Most of our earlier patrons have answered their last call, and now I can go any time to the cemetery and find more of the names that appeared in our first directory than I can in our most recent issue." That shows that it is a good business and evidently a healthful occupation.

This, also, they can begin to see: The fulfillment of the plans so long labored on to make their plants more serviceable for the community's needs. They can begin to follow the pattern which their lives and others are being woven into in the town's history. All this should encourage us to take heart, especially now that our work has won the confidence of the money investing public, and proceed more assuredly along the pathway to greater service and greater success.

Just now, when it would seem that most of us are through with present financing and building extensions, we look about us and find almost every company preparing to invest money in much larger sums than ever before to take care of the needs of the public in our line. Still others are beginning to see an opportunity to take on side lines, such as wired wireless service and transmitting radio programs as a regular feature.

It is being done at a profit and the telephone company can do it cheaper than a separately-operated company with no telephone experience. In any event the telephone company should be in a position to control the service—either by owning and leasing the circuits or furnishing the whole service—for the reason that it will limit the presence on the highway to two sets of poles instead of three, as would be the case if a separate company were formed independent of the telephone people. Two sets of poles, light and telephone, are enough for a farmer to contend with.

Some companies have sold radio supplies since they came on the market and have made good at it. In the big cities, telephone companies are building new exchanges, right and left, and converting to automatic in many instances at a cost of many thousands of dollars.

Surely this spells not only confidence on the part of the telephone companies but proved permanency as to the demand for our services on the part of the public. In 50 years the telephone has proved itself as an indispensable adjunct to our modern business, professional and social structures.

This, then, being so plainly true and demonstrable, we need have no hesitancy in mapping out larger and better plants and wider scopes of service, with full confidence that neither our efforts nor our dollars will be lost; being, of course, careful to so build and so finance that the elements of success are in the venture from the start.

"Each Day I See a Town to Be Grown from Our Town of Today; Let's All Pull for the New Town, the Town of Our Children's Day."

Go forward, not like Columbus on uncharted seas, but like a modern vehicle on a paved highway, confident of reaching your destination in a reasonable time.

APHORISM: An eagle needs more vision than an angle worm.

Improving Public Relations by Informational Talks to Groups.

The Lincoln Telephone & Telegraph Co., Lincoln, Neb., conducted an active public relations program during the year 1926, the principal activities being during the months from October to January. Talks were made to 2,200 different groups, attended by about 12,000 persons; 50 per cent of the talks were to the schools and 75 per cent of total audience were school children.

These talks are being given by officers of the company, General Manager Agee, Chief Engineer Wheeler, Assistant Commercial Superintendent McCulla, Plant Superintendent Caster, Traffic Superintendent Brewster, Milton Barratt of the engineering department, and C. W. Motter, publicity director.

The speakers have discussed the various departments of service rendered, the general relation of the telephone to community life, the vision and purposes of the company, and the relation of radio to telephony, stressing their interdependence and the place of each.

Prompt Shipments

WHEN Long-Bell promises shipment of Long-Bell Creosoted Yellow Pine Poles on a certain date, you can depend on the promise being fulfilled. Large stocks of poles, plus modern facilities, enable us to give prompt and efficient service.

Write for "*Sentinels of Service*", our Booklet which tells the complete story of Long-Bell Poles and the service they are giving.

The Long-Bell Lumber Company
2130 R. A. Long Bldg. Kansas City, Mo.

LONG-BELL
CREOSOTED *Yellow Pine Poles*

No. 1 Tree Trimmer

No. 4 Pole Saw

The Bartlett Tree Trimmer

"Insulated to 105,000 Volt"

Bartlett Tree Trimmers are the choice of hundreds of leading central power stations because they are insulated for work on H.T. lines, and they have unusual capacity. The jaws are designed to shear branches of 1¼ in. diameter, however this tool is capable of cutting a locust pin with the slightest effort. The compound lever action and drop-forged steel construction result in power and long life.

The operating rod is a turned Bakelite insulator, tested at 105,000 volts.

A quality tool throughout, the Bartlett Trimmer is offered as the best means of protecting your lines and workmen.

For Larger Limbs—No. 4 Pole Saw

For limbs larger than the capacity of our Insulated Tree Trimmer, we recommend our No. 4 Pole Pruning Saw with 16 in. blade.

Saw is adjusted to three angles to suit the operator's position. Blade is ground for clearance to prevent binding. It is stamped from cold rolled .90 carbon steel.

Poles shellacked to prevent moisture absorption; supplied in lengths from 8 to 16 ft. and extra sections with aluminum "Quick Change" sleeve for extending length of pole if desired.

BARTLETT MFG. CO.
451 E. Lafayette Ave., Detroit, Mich.

"INDIANA"

Double Galvanized Telephone and Telegraph Wire

Crapo Patents

Non-Peeling
Non-Cracking

At last the Telephone and Electrical Industry is assured longer life and lower maintenance on galvanized wire construction through our *new* and *improved* patented Galvanizing Process, which insures a wire with Non-Peeling and Non-Cracking Zinc Coating. Now in full commercial production. Carried in stock by Representative *Supply Jobbers*.

Illustration at right shows what happens to old process galvanizing, while illustration at left shows assured results of Crapo process—(patented).

Galvanized Steel Strand

Standard or Commercial, Siemens-Martin, High Strength and extra High Strength Grades

Indiana Steel & Wire Co., Muncie, Ind

Glazed Vitrified Clay Conduits

The Quality of our Conduits is the very best ALWAYS

We carry large stocks of round single, square single, two, three, four, six and nine duct in standard and short lengths in splits and bends.

CLAY PRODUCTS CO., Inc.
BRAZIL INDIANA

The Financial Side of Companies

Items of Interest Regarding Financial Matters of Independent and Bell Telephone Companies—Facts and Figures from Annual Reports Show Healthy Growth of Industry — Activities in Construction Work — Some Statistics

Share Earnings of Pennsylvania Bell Increase Nearly 15 Per

The Bell Telephone Co. of Pennsylvania reports, for year ended December 31, 1926, net income of $9,384,586, after taxes, interest, etc., equivalent, after preferred dividends, to $10.10 a share earned on $80,000,000 common stock. This compares with $8,286,960, or $8.75 a share, in 1925.

Income account for 1926 comparisons are given in the accompanying table.

	1926	1925	1924	1923
Gross	$56,340,022	$50,630,200	$46,531,023	$41,145,358
Net after tax	13,836,818	11,617,871	9,451,226	7,368,175
Gross Income	15,778,142	13,605,376	11,123,217	8,978,067
Interest, etc.	6,393,556	5,318,416	4,602,101	3,704,396
Net income	$ 9,384,586	$ 8,286,960	$ 6,521,116	$ 5,273,671
Preferred dividends	1,300,812	1,282,341	1,035,949	.....
Common dividends	6,400,000	6,400,000	5,200,000	4,800,000
Employes' benefit reserved	350,000	.....	.....	.....
Surplus	$ 1,333,773	$ 604,619	$ 285,167	$ 473,671

Comparative Financial Statements of Pennsylvania Bell Company for Past Four Years.

Illinois Bell Report for 1926 Shows Increased Earnings.

The annual report of the Illinois Bell Telephone Co. for 1926 shows that the telephone operating revenues were $67,190,937, the operating expenses were $48,147,821, leaving the operating revenue as $19,043,115. The operating income was $12,182,885 and the total gross income $12,552,415.

The net income after the charges, but before the dividends were deducted, is $8,870,681 for 1926. The balance carried to surplus, after deducting dividends ot $6,400,000 and employes reserve of $600,000 is $1,870,681. The earning on a share of stock is $11.08, while the preceding year it was $10.29. The net income for 1925 was $8,236,426.

The report shows that for new construction the expenditure amounted to $28,878,370, and that expenditures for new construction in 1927 are estimated at $36,500,000.

Straightforward trunking equipment was provided in all Chicago offices outside the central business district and in some of the larger suburban exchanges, which enables speedier connections to be made between subscribers in different office areas.

There were 57,306 more telephone subscribers in Chicago during 1926 than during the previous year. The daily average number of local calls for the year was approximately 5,670,000, an increase of 8.5 per cent over 1925. The daily average for the city of Chicago was approximately 3,808,000. The increased demand for toll service is evidenced by the fact that the total toll messages for the year will exceed those of last year by 18.5 per cent.

Summary of Class A Company Reports for Month of November.

The summary of monthly reports of 71 Class A telephone companies for November, as compiled by the bureau of statistics of the Interstate Commerce Commission, is reproduced on this page. According to the summary, a total of 13,784,674 stations was in service in November, 1926, an increase of 6.3 per cent over the preceding year.

Telephone operating revenues for the month amounted to $75,506,386, an increase of 9.9 per cent; operating expenses, $49,664,827, an increase of 7.9 per cent, and operating income, $19,262,342, represented an increase of 12.8 per cent. The ratio of expenses to revenues was 65.78, a decrease of 1.20 per cent.

The eleven months ended with November showed that telephone operating revenues totaled $799,827,894, an increase of 10.9 per cent; operating expenses, $535,232,309, an increase of 9.2 per cent; and operating income, $192,480,553, an increase of 12.8 per cent. The ratio of expenses to

Item.	Month of November				Eleven months ended with November			
	1926.	1925.	Increase or decrease (*). Amount.	Ratio, Pct.	1926.	1925.	Increase or decrease (*). Amount.	Ratio, Pct.
Number of company stations in service at end of month	13,784,674	12,961,991	822,683	6.3	.....	.....	.....	....
Revenues:								
Subscribers' station revenues	$47,683,099	$43,878,994	$3,804,105	8.7	$503,452,452	$460,181,358	$43,271,094	9.4
Public pay station revenues	3,310,044	2,963,242	346,802	11.7	35,113,935	31,169,824	3,944,111	12.7
Miscellaneous exchange service revenues	547,243	518,968	28,275	5.4	5,978,467	5,421,341	557,126	10.3
Message tolls	19,982,947	17,845,587	2,137,360	12 0	213,455,930	188,507,228	24,948,702	13.2
Miscellaneous toll line revenues	2,307,319	2,021,416	285,903	14.1	23,921,458	20,849,756	3,071,702	14.7
Sundry miscellaneous revenues	1,633,389	1,464,723	168,666	11.5	17,450,498	14,790,207	2,660,291	18.0
Licensee revenue—Cr.	2,587,993	2,628,693	*40,700	*1.5	27,445,514	27,762,499	*316,985	*1.1
Licensee revenue—Dr.	2,545,648	2,589,446	*43,798	*1.7	26,990,360	27,303,898	*313,538	*1.1
Telephone operating revenues	$75,506,396	$68,732,177	$6,774,209	9.9	$799,827,894	$721,378,315	$78,449,579	10.9
Expenses:								
Depreciation of plant and equipment	$11,762,558	$10,873,245	$ 889,313	8.1	$124,132,235	$112,082,082	$12,050,153	10.8
All other maintenance	11,303,190	10,185,236	1,117,954	11.0	121,256,415	108,037,094	13,219,321	12.2
Traffic expenses	17,273,903	16,557,990	715,913	4.3	189,426,843	178,127,468	11,299,375	6.3
Commercial expenses	6,433,323	5,801,765	631,558	10.9	68,448,258	61,873,235	6,575,023	10.6
General and miscellaneous expenses	2,891,853	2,621,937	269,916	10.3	31,968,558	29,821,633	2,146,925	7.2
Telephone operating expenses	$49,664,827	$46,040,173	$3,624,654	7.9	$535,232,309	$489,941,512	$45,290,797	9.2
Net telephone operating revenues	$25,841,559	$22,692,004	$3,149,555	13.9	$264,595,585	$231,436,803	$33,158,782	14.3
Other operating revenues	.....	.....	.....	....	.....	$ 666	*$ 666	....
Other operating expenses	.....	.....	.....	....	.....	926	*926	....
Uncollectible operating revenues	$ 490,511	$ 419,575	$ 70,936	16.9	$ 4,978,627	4,440,323	538,304	12.1
Operating income before deducting taxes	$25,351,048	$22,272,429	$3,078,619	13.8	259,616,958	$226,996,220	$32,620,738	14.4
Taxes assignable to operations	6,088,706	5,330,868	757,838	14.2	67,136,405	56,367,648	10,768,757	19.1
Operating income	$19,262,432	$16,941,561	$2,320,781	13.7	$192,480,553	$170,628,572	$21,851,981	12.8
Ratio of expenses to revenues, per cent	65.78	66.98	*1.20	....	66.92	67.92	*1.00	....

Summary of Monthly Reports of Class A Telephone Companies for November, as Compiled by the Bureau of Statistics of the Interstate Commerce Commission.

revenues was 66.92 per cent a decrease of 1 per cent.

These figures cover companies each with annual operating revenues of $250,000.

Keystone Company of Philadelphia Has Surplus of $482,469.

The Keystone Telephone Co. of Philadelphia, Pa., reports, for year ended December 31, 1926, surplus of $482,469, after ordinary taxes and interest, but before federal taxes and reserves, comparing with $455,553 in 1925.

The company has outstanding 30,000 no-par shares of $4 cumulative preferred stock and 50,000 shares of common stock.

The statement for 1926 compares:

	1926	1925	1924
Gross	$2,071,395	$1,991,960	$1,905,675
Net after ordinary taxes	1,094,894	959,040	890,791
Surplus after interest*	482,469	455,553	377,121

*Available for federal taxes, reserves, dividends, etc.

Varied Statistics of Northwestern Bell Telephone Co.

During the year 1926 nearly 1,800 public meetings and demonstrations were held by the Northwestern Bell Telephone Co. in the five states in which it operates, the two Dakotas, Minnesota, Nebraska and Iowa. The attendance at these was estimated at 125,000.

There were also held 7,800 employes' meetings with a total attendance of 47,600. Approximately 270,000 people visited the company's central office on 10,000 trips arranged. During the year 98,300 stations were installed and 87,800 discontinued, a net gain of 10,500 stations, or 750 more than the 1925 gain.

The company sold 50,000 shares of its own stock and placed 16,667 shares of the American Telephone & Telegraph Co. stock with 2,457 new buyers. The Northwestern Bell offering was oversold 31,000 shares.

Home T. & T. Co. of Fort Wayne, Ind., Plans $550,000 Expenditure.

The general budget for 1927 for the Home Telephone & Telegraph Co., Fort Wayne, Ind., involves an expenditure of approximately $550,000. Of this amount, $100,000 will be spent for a new warehouse and garage, which will be erected on property the company already owns.

In outlining the work to be done in 1927, H. E. Gray, general plant superintendent of the company, said that one of the first projects to be accomplished this year is the complete rehabilitation of the distributing system in the downtown business section of Fort Wayne, including complete rehabilitation of interior and house systems.

Aerial cable systems will be installed in the new North Highlands addition to Fort Wayne, and in the new addition west of the International Harvester plant.

Another step to be undertaken during 1927 is the extension of No. 19 gauge cables into the rural districts surrounding Fort Wayne. Several of these will extend a number of miles from the city limits. Work has already been started in some of the rural districts.

The budget includes the installation of several new private automatic and private branch exchanges and some central office equipment in the Harrison office.

A gain of approximately 1,300 new subscribers was made in 1926 in Fort Wayne and a similar gain is anticipated for 1927. The company now has more than 29,000 stations in Fort Wayne.

Increases Capital Stock Following Commission Suggestion.

Following a suggestion from the Nebraska State Railway Commission in a recent hearing for issuance of stock, the Naponee Home Telephone Co. has filed with the secretary of state a certificate that it has increased its capital stock from $10,000 to $15,000.

Prices in the Metal Markets.

New York, February 14—Copper—Firm; electrolytic spot and futures, 13c. Tin—Steady, spot and nearby, $69.25; April, $67.12. Lead—Dull; spot, 7.40c.

Armored against the poke and pull

You can preach until doomsday about proper handling of cords and yet in the rush of peak traffic they're bound to be shamefully abused.

It's been the same way for more than a quarter of a century and all during that time Runzel-Lenz, as the foremost cord making specialists, have been engaged in a constant campaign to offset these abuses of cords with material and design that defy the worst that wear has to offer.

Each item of raw material used in Runzel-Lenz cords is carefully and completely tested before we put it into a cord. When you buy these cords you are making certain that you've done everything possible to cut your cord costs and maintain your cord service at the highest standard.

RUNZEL-LENZ ELECTRIC MFG. CO.

Cords for Every Telephone Company Requirement

1751 N. Western Ave. Chicago, Ill.

What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule of Telephone Hearings

No Nebraska Legislative Bills Directly Affecting Telephones.

The time fixed by the constitution for the introduction of bills by members of the Nebraska legislature now in session has ended, with not one of the total of 946 directly affecting the telephone industry, probably for the first time in legislative history. Formerly the aspiring politicians who desired to stand in with the anti-monopolists were certain to father one or more bills covering toll rates, but in recent sessions about the only bills that have shown up were the product of some local condition that some legislator desired to clear up by presenting a bill that would apply all over the state.

The situation is an unusual one, for there are generally to be found one or more members who have a local situation not to their liking, which they attempt to right by introducing a bill that they think will produce the desired results.

The decisive action of the federal court in the matter of the Northwestern Bell rates has cured radicals, apparently, of a notion that the legislature can reduce toll rates, which have been the principal source of attempted legislation.

The one bill before the Nebraska legislature in which the telephone companies of Nebraska were most vitally interested, that providing for an eight-hour day for women in all cities and villages of the state, has been killed by the house by an overwhelming vote. The present law provides for a nine-hour day, which may be made up of several shifts, and applies only to cities of over 5,000 inhabitants. The introducer, who is a candidate for city commissioner in Omaha and a bidder for labor support, wanted also a provision that would reduce the number of shifts to two and these to be each of four hours' duration.

The protest of the telephone companies before the committee that had the bill in charge was presented by Frank A. May for the Northwestern Bell Telephone Co., and by Secretary George M. Kloidy of the state association for the smaller companies of the state—a form of service to them that they would have been powerless to do for themselves.

They pointed out the effect such a law would have upon rates and service in the smaller exchanges, where 24-hour service is given as well as those where only night hour service is given. The supreme court has held that operators who are asleep but subject to duty calls are legally at work, and the proposed law would impose ruinous burdens on the small companies.

Faced with the possibility of the entire bill being defeated from a flood of demands from the smaller utilities out in the state, the labor group agreed to insert a proviso that it did not apply to public service corporations. It was so amended, and was reported back to the house favorably, but so changed that about all that was left was the reduction in hours per day and the limiting of the number of shifts to two, with the same restricted application as now to cities of the first class.

Farmer members attacked it from all sides, one of their principal arguments being that the eight-hour day for women would be an additional lure to pull people away from the farms to the cities, and they voted the whole bill down.

Kehm is also author of another bill that would give the city commission of Omaha, corresponding to a city council, authority to fix rates for telephone service, for street-car companies and bus lines. It is not expected that this will get very far, as it contravenes the constitutional provision that creates the state railway commission, which exercises regulatory and supervisory powers over all three industries.

There are a half-dozen different compensation bills. One of them would give the state a complete monopoly of all of this insurance and bar private companies from competition. Others would change the procedure of the commissioner, permit attorney fees to be charged for appearances before the commissioner, limit the period of total disability and limit doctor and hospital bills.

The federation of labor of the state has had introduced a bill which would bar all the private companies from the state and hand over to a specially-created department collection of enough premiums to meet all awards and leave a 10 per cent reserve fund. The federation leaders do not expect it to pass at this session.

The feeling is that, as none of the insurance companies is making any money at the present schedule of rates, which are higher than most other states, it would be an expensive proposal to have the state take it over as a monopoly proposition, since administration and compensation expenses would be certain to increase with no experts such as the companies employ to investigate and oppose many claims.

Indiana Mutual Telephone Company Authorized to Raise Rates.

The Vigo Mutual Telephone Co., operating in the counties of Vigo and Vermillion, was authorized late last month to increase its rates by the Indiana Public Service Commission. The company filed a petition for an increase with the commission on October 8, 1926.

The new rates, as allowed by the commission, are as follows: Business, individual line, $2 per month; business, party line, $1.75; residence, individual line, $1.75; residence, party line, $1.50; rural party line, unlimited, $1.50, and desk telephones, 25 cents extra. The order provides that the new rates go into effect on April 1.

Kentucky Court Refuses Franchise for Duplicating Company.

The Bracken County Fiscal Court at Brooksville, Ky., on February 8, refused the application of the Northern Kentucky Mutual Telephone Co., of Augusta, Ky., to advertise a franchise for sale.

In October, 1926, the same company applying for a franchise over the entire county, the wires and cables to be strung on the poles of the Kentucky Power Co., with which it is closely allied, was refused a franchise. It then brought mandamus proceedings in the circuit court to compel the fiscal court to advertise a franchise for sale. While that court has not ruled definitely on the case, the telephone company temporarily abandoned that course and applied for a franchise on certain turnpikes in order to enable it to connect its Augusta and Germantown, Ky., exchanges which are in process of installation. The company agreed to run a separate pole line, but the court again refused.

The Fiscal Court of Bracken County is to be commended for refusing to become a party to afflicting the public with dual telephone service. The county already has one telephone system, the Bracken County Telephone Co., which has supplied the people in that county with telephone service for a quarter of a century. This company has its headquarters at Brooksville and also an exchange at Augusta.

Judge Orders Southern Michigan Telephone Co. Sold.

The Southern Michigan Telephone Co. of Sturgis, Mich., was recently ordered sold in a decree issued by Federal Judge Fred M. Raymond. The sale under the direction of Attorney Kirk E. Wicks, master in chancery, is scheduled for March 2 at St. Joseph county courthouse, Centerville, and the lowest acceptable bid was fixed at $625,000 unless otherwise ordered by the court.

The concern has been operating under a receivership for the 2½ years under John

W. Coffey of Indianapolis as receiver. The company has 6,520 subscribers, principally in Branch and St. Joseph counties, Michigan, and Lagrange county, Indiana. The decree was on an intervening petition of a bondholders' committee.

Missouri Company Granted Increase In Class A Rural Service.

The Farmers & Merchants Mutual Telephone Co., of California, Mo., was authorized on January 18 by the Missouri Public Service Commission to increase its rates for Class A rural line service from $4.80 to $6.00 per annum, effective February 1.

The commission found that Class A rural line service was furnished by a telephone company where the subscribers own and maintain all equipment outside the city limits and that 340 Class A rural line subscribers were served. The company had $5,225 of stock issued and outstanding and a statement filed by it showed the value of the entire property to be $16,860.33, including jointly-owned lines to other exchanges.

The commission further found that the annual revenue from all sources amounted to $5,696.23, and the annual expenses to $4,394.74, leaving $1,301.49 for depreciation reserve and return on the investment. The increase requested would amount to $340 per annum and produce a total of $1,641.49 for depreciation and return, or 10 per cent on the rate base, which, the commission stated, was not unreasonable.

Mortgage Authorized to Provide Funds to Pay Damage Judgment.

The Nebraska State Railway Commission has given permission to the Wolbach Telephone Co. to place a five-year 8 per cent mortgage on its property in order to pay off the judgment recently affirmed by the state supreme court, for $6,000, resulting from an accident in which one of the company's employes was involved.

The company was represented at the hearing by Ole Christensen, the principal owner. He said a majority of the stockholders have voted to issue the mortgage in order to pay off the judgment, as no other funds were available.

The company operates an exchange at Wolbach, Greeley county, with service lines extending into Howard and Nance counties. The commission engineers reported that it has property that cost $44,000, in 59 per cent condition, or worth $26,000, depreciated, or $37,000 at present costs.

The company paid $1,123 dividends last year on $25,100 common stock, has a depreciation reserve of $11,303 and $4,234 surplus. Total revenues were $6,832.46 and expenses of operation, with no salaries paid officers, were $5,840.05. This left an operating income of $99,241, from which were deducted taxes of $255, interest on $2,207 notes payable of $290, and dividends of $1,123, leaving a debtor balance of $676.89.

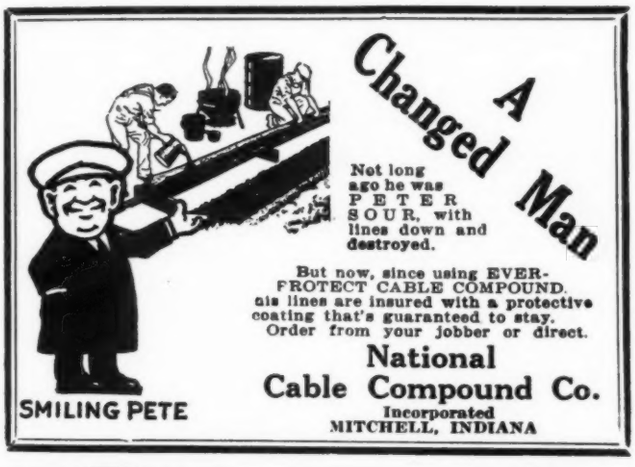
Increase Allowed; Manager Should Be Paid for Services.

The Nebraska State Railway Commission has granted an increase in rates to the Petersburg Telephone Co., but has denied it the right to make a toll charge for talks with Elgin. It is a co-partnership that has been conducting business at a loss, and did not have any money left to even pay its manager anything at all.

The property consists of a central office, and the distribution system is entirely within the city limits. It owns a half interest in a toll line to Albion, with the Monroe company. Ninety-six town stations are served and 219 farmers are switched.

The company has been charging business stations $1.50 a month and residence $1.00 a month. The new rates will be $2.25 for business and $1.50 for residence. J. J. Carey is manager.

Revenues for last year were $2.356.75 and expenses of operation $2,635.58. With taxes and interest included, the deficit for the year was $395.25. No pay was drawn by the manager and no officer drew any salary. The plant operated is grounded in type, and patrons complained of some of the service given, but this is explainable by


A Changed Man
Not long ago he was PETER SOUR, with lines down and destroyed.
But now, since using EVER-PROTECT CABLE COMPOUND, his lines are insured with a protective coating that's guaranteed to stay. Order from your jobber or direct.
National Cable Compound Co.
Incorporated
MITCHELL, INDIANA
SMILING PETE

Hazard
RUBBER INSULATED
WIRES & CABLES

SERVICE readily maintained when Hazard Telephone Wires and Cables are used. They are a Quality product, made up to Hazard Standards, for trade that demands a superior wire.

HAZARD MANUFACTURING CO.
Wilkes-Barre, Pa.

New York 533 Canal Street
Chicago 32 S. Clinton St.
Pittsburgh 1st Nat'l Bk. Bldg.
Denver 2125 Blake Street
Birmingham Brown-Marx Bldg.

Mentioning TELEPHONY makes it a better paper.

the necessity of moving some main leads to care for paving. The company will add some cable and make other improvements.

The rates granted will give the company a net income of $600. The commission says the manager should be paid something for his services, and the owners are entitled to a return on their investment. None have been paid for ten years.

Investigation developed that the line on which the company desired to make a toll charge of ten cents was built by 18 farmers who are switched by the exchange for a dollar a month. They also built their own line into Petersburg. The traffic has become so large as to be burdensome.

The commission says it has no power to permit a company to charge a toll rate over a line it does not own, and suggests, as an alternative, that the farmers pay the regular switching rate of $4.80 a year charged others. Free service has been given over this line to three other exchanges.

Bell's Petition for Increased Mileage Charges Approved.

The North Carolina Corporation Commission on January 8 approved the petition of the Southern Bell Telephone & Telegraph Co. for increased mileage charges to apply in connection with main stations or private branch exchange systems located outside the base rate area but within the exchange area.

The commission found that it was an established custom by telephone companies, and one long recognized by rate-making bodies, that the cost of special service should be borne by the subscribers to such special services. The present mileage charges have been in effect in North Carolina for more than 25 years and were established before there was state regulation of such rates. At the time these rates were made applicable in the state, little of this class of service was furnished by the Southern Bell.

The commission also found that the cost of telephone line construction had more than doubled during the period in which the present rates had been in effect, and because of the increased demand for exchange service beyond the base rate area involving increased costs, some adjustment of the mileage charges should be made in order that the additional cost of such construction may be borne by the subscribers to such services and not be cast upon the great body of subscribers receiving no particular benefit from this special service.

It was, therefore, held that the Southern Bell Telephone & Telegraph Co. should be authorized to increase the mileage charge for individual lines, private branch exchange trunk lines, or ringing circuits from 42 cents to 63 cents per quarter mile or fraction thereof per month; the mileage charge for two-party lines from 21 cents to 32 cents per quarter mile or fraction thereof per month for each main station; and the mileage charge for four-party lines from 11 cents to 16 cents per quarter miles or fraction thereof per month for each main station.

Hearings Resumed in Ohio Bell State-Wide Case.

The taking of testimony by the Ohio Public Utilities Commission in the statewide investigation of telephone rates, as it applies to the Ohio Bell Telephone Co., was to be resumed February 15 after a delay of two months. The delay was announced to give the state time to collect evidence in an attempt to refute the valuation claims made by the telephone company.

Expert accountants and appraisers have been busy in the two months checking up on the claims of valuation on physical property and some diverse evidence will be introduced.

Commission Alleges Failure to Comply With Its Instructions.

An investigation will be made by the Wisconsin Railroad Commission into the alleged failure of the Mount Vernon Telephone Co. to comply with an order issued by that body March 9, 1922. The commission recently served notice on the officers of the company that it would after ten days fix a time and date of hearing.

According to the notice issued the commission entered an order March 9, 1922, on the application of the company for authority to increase telephone rates. Among other things it ordered the Mount Vernon concern to "reduce the number of subscribers per line so as not to exceed 12 per line, excepting that where necessity requires a greater number may be served per line providing permission is duly obtained from the commission."

The commission claims a service inspection has disclosed that the company did not fully comply with this order.

Summary of Commission Rulings and Schedule of Hearings.

CALIFORNIA.

February 7: The Pacific Telephone & Telegraph Co. authorized to acquire and operate the properties of Turlock Home Telephone & Telegraph Co., free and clear of encumbrances, in consideration for the payment of $100,000 in cash, under a modified agreement superseding the one heretofore approved by the commission.

February 10: Roseville Telephone Co., Roseville, authorized to issue and sell $12,500 of common capital stock at not less than par, for the purpose of reimbursing its treasury.

February 11: Pomona Valley Telephone & Telegraph Union applied for permission to issue and sell $100,000 par value of its common capital stock and to use the pro-

To Manufacturers of and Dealers in Telephone Equipment and Supplies

During the last year the telephone field has seen many changes in the personnel of its operating companies.

These alterations generally were reorganizations, consolidations and mergers for the purpose of raising money to reconstruct and improve the properties.

The actual plans for re-construction and expansion will, therefore, in most cases, be carried out during 1927. This, then, is an indication that the volume of purchases by telephone companies undoubtedly will be greater during 1927 than in recent years.

All these changes have been recorded in the 1927 edition of TELEPHONY'S DIRECTORY OF THE TELEPHONE INDUSTRY.

In addition to the listings of all Independent and Bell companies as in previous years, the 1927 book will list separately every Independent telephone exchange of commercial size (having a switchboard or 50 telephones).

For your successful solicitation of telephone company business during the ensuing year it will be necessary for you to have a copy of the 1927 Directory to compete with other firms. As in the past the Directory is obtainable in three ways:

(1) Complimentary to Directory advertisers.
(2) Complimentary to TELEPHONY advertisers.
(3) $20 per copy to non-advertisers.

We would suggest that you advise us immediately upon what basis you will wish to receive your copy of the 1927 DIRECTORY.

Telephony.
THE AMERICAN TELEPHONE JOURNAL

608 S. Dearborn St. - Chicago

ceeds derived from the sale thereof to pay indebtedness and to finance additions and betterments.

ILLINOIS.

February 15: Hearing at Springfield on joint application for the approval of sale by the Casey Telephone Co., Toledo Telephone Co. and Neoga Telephone Co. and purchase by the C. T. & N. Telephone Co. of the telephone properties of the former companies, also for a certificate of convenience and necessity to the C. T. & N. Telephone Co., and authority to issue $40,000 of its preferred stock and $60,000 of its common stock and $60,000 of its first mortgage bonds.

February 16: Hearing at Springfield on petition for an order requiring W. S. Terry, doing business as Goreville Telephone Co., to enter into an intercorporate contract with the Illinois Southern Telephone Co. covering connections between lines from Goreville to Marion and Vienna, Williamson county.

February 16: Hearing at Springfield on complaint regarding invasion of territory by the Versailles Telephone Co. in vicinity of Perry, Pike county. Petition filed by Versailles Telephone Co. and certain other subscribers that the Perry Telephone Co. has not complied with order entered October 6, 1926, as to the rehabilitation of its telephone lines so as to serve subscribers and for a stay order staying the date when Versailles Telephone Co. shall discontinue rendering switching service to certain subscribers, etc.

February 17: Hearing at Springfield on application of the Commercial Telephone Co. for a certificate of convenience and necessity to construct and operate a telephone system in the village of Bluford.

February 17: Hearing at Springfield in the matter of citation by Illinois Commerce Commission on its own motion to Teutopolis Telephone Co. to show cause for placing in effect advanced rates for telephone service without compliance with provisions of the Illinois commerce commission law. Hearing also in the matter of proposed advanced rates for telephone service as stated in rate schedule Ill. C. C. No. 2 and Ill. C. C. No. 3 covering toll rates and supplemental petition for support of proposed rates filed by Teutopolis Telephone Co.

February 17: Hearing at Springfield in the matter of proposed advance in rates of the Teutopolis Telephone Co. for telephone service in Teutopolis and vicinity, Effingham county, stated in rate schedule Ill. C. C. No. 1 sheet No. 1 as filed by the company.

February 17: Hearing at Springfield in the matter of proposed advance of rates of the Sullivan Home Telephone Co. now owned and operated by the Illinois Central Telephone Co. for toll service in Sullivan, Moultrie county and vicinity, stated in rate schedule Ill. C. C. No. 3, sheets 10 and 14, inclusive rendered by the company. Petition filed by petitioner to reopen case for further hearing.

INDIANA.

January 21: Vigo Mutual Telephone Co., operating in counties of Vigo and Vermilion, authorized to increase rates. They become effective April 1.

January 28: Dillsboro Telephone Co. authorized to issue 200 shares of common stock; the Southern Indiana Telephone Co. authorized to take over the Dillsboro company.

January 28: Raleigh Telephone Co. authorized to increase rates ranging from $1.50 to $2.75 on various kinds of service, effective February 1.

January 28: Amboy Telephone Co. given authority to increase rates, effective February 1.

MICHIGAN.

February 4: Application filed asking approval of exchange of property between Michigan Bell Telephone Co. and the Union Telephone Co. The Union property that the Michigan Bell Telephone Co. wants is between Linden and Byron, and that desired by the Union company is between Fenton, Linden, Ovid and St. Johns.

MINNESOTA.

February 25: Hearing on application of Mankato Citizens Telephone Co., Mankato, for authority to change its schedule of rates.

MISSOURI.

January 8: Farmers & Merchants Mutual Telephone Co., California, authorized to increase its rates for Class A rural line service from $4.80 to $6.00 per annum.

January 10: Troy Telephone Co., authorized to charge 10 cents per message between the exchanges at Troy and Hawk Point, and Troy and Moscow Mills. Increases in monthly rates and for move charges and desk telephones were also allowed.

NORTH CAROLINA.

January 8: Southern Bell Telephone Co. authorized to increase mileage charges of main stations or private branch exchange systems located outside the base rate area but within the exchange area.

OHIO.

January 28: Proposed increase in rates of St. Mary's Telephone Co. suspended for period of four months, dating from December 31, 1926.

February 15: Hearings resumed in Ohio Bell state-wide rate investigation.

OKLAHOMA.

February 16: Hearing at Stilwell on complaint of B. Richardson vs. J. R. Grounds, of Stilwell, alleging unsatisfactory telephone service.

February 18: Hearing at Fairfax on complaint of city of Fairfax alleging inadequate telephone service.

PENNSYLVANIA.

February 8: Hearing on applications of the Valley Telephone Co., operating in Butler, Venango and Clarion counties, for approval of acceptance of the provisions of the act of July 22, 1919. All telephone companies, when originally granted charters in past years, were given authority to operate telegraph systems as well as telephones. Before any of the companies holding the dual privilege, but operating telephones only, can sell out to another telephone company, the law of 1919 specifies they must surrender their telegraphic rights.

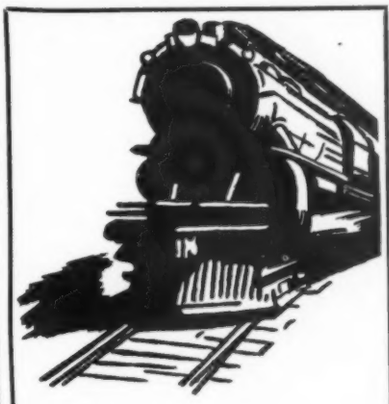
February 8: Hearing on application of the Home Telephone Co., of Ridgway for approval of acceptance of the provisions of the act of July 22, 1919. The company operates in Armstrong, Bradford, Butler, Clarion, Clearfield, Clinton, Forrest, Potter, Tioga, Venango and a part of Jefferson counties.

WASHINGTON.

January 27: Hearing held at Toledo on rates and service. The Cowlitz Prairie Telephone Association, the Home Telephone Co. of Winlock, the Toledo Telephone Exchange Co. and the Pacific Telephone & Telegraph Co. all had delegations in attendance.

WISCONSIN.

February 5: Hoosier Telephone Co., ordered to desist from extending service to two subscribers whose lines were built without the consent of the commission and who could better be served by the Home Telephone Co., Eagle, whose lines are closer to these two residences.



Saving hours

SPEED, combined with durability, has made the monster locomotives of today the chief means of 20th century transportation.

In like degree, speed of installation, combined with their other features, has made Bonita Cable Rings the choice of numerous telephone companies throughout the country.

BONITA CABLE RINGS

have been devised and perfected with maximum service in mind. The uniformity and strength of every ring is guaranteed both **before** and **after** it reaches your job.

In eight sizes. Every size for any strand diameter.

Write today for samples!

Cameron Appliance Co.
EVERETT, MASS.

With the Manufacturers and Jobbers

Tells Rotarians City's Part in Telephone Development.

An interesting address on "Hartford's Part in Telephone Development" was made by George A. Long, vice-president and general manager of the Gray Telephone Pay Station Co., Hartford, Conn., before the Hartford Rotary Club on January 31. Mr. Long is a pioneer in the telephone accessory manufacturing business. When 16 years old he made the first model of a telephone pay station, and since then he has taken out more than 100 patents covering the development of the device.

The first pay station appeared in 1888, Mr. Long said, and "the tremendous amount of use the telephone pay station is being put to can be realized when we find that in the city of New York alone the number of coins taken in are 375,000,000 annually, which weigh 2,800 tons. . . .

"It is estimated that the number of nickels collected in one year from pay stations, if placed side by side, would form a metal strip sufficiently long to reach from New York to San Francisco and extend 800 miles farther into the Pacific ocean. In our own state (Connecticut) we find the weight of collections taken from pay stations last year was over 96 tons."

Mr. Long emphasized the fact that Hartford has provided means whereby the general public can and does use the telephone, and that through these means the operating telephone companies have been able to reap a harvest they would not otherwise enjoy.

Quick Action With

UNIQUE

Speed and improved equipment!—two essentials necessary to the efficiency of your linemen and economical line maintenance.

Unique torches supply the means to efficient workmanship. Storm has no effect on Uniques. An automatic orifice cleaner permits no clogging.

Write today for catalog that describes in detail their many features

UNIQUE MFG. CO.
113 N. DESPLAINES ST.
CHICAGO, ILL.

New District Manager of Page & Hill Co. at Kansas City.

James K. Hill has recently been made district manager of Page & Hill Co., producers of northern white and western red cedar poles. Mr. Hill will have charge of the southwestern states with headquarters at Kansas City, Mo.

James K. Hill, of Page & Hill Co, Is Now District Manager in Charge of the Southwestern States, with Headquarters at Kansas City, Mo.

Mr. Hill goes to the Southwest with extensive experience in the production and service end of the cedar pole business. He is well known to many of the telephone fraternity through his service contact with telephone companies during the past few years.

Standard Underground Cable Co. Awarded Gold Medal.

The Standard Underground Cable Co., Pittsburgh, Pa., has been awarded a gold medal by the International Jury of Awards of the Sesqui Centennial Exposition, in connection with the exhibit of its products, including bare and insulated electric wires and cables, cable terminals, junction boxes and accessories, a gold medal being the highest award in this class of exhibits.

The company's exhibit, as a whole, was planned to show the general scope of its manufactured products at the present time and also the progress and improvement made since the early days of the industry.

The Standard Underground Cable Co. was one of the pioneers in the United States to engage in the manufacture of lead-covered underground electric cable. In the year 1883 its first underground cable was installed in Washington, D. C., connecting some of the government buildings.

This was a pioneer installation and a tryout of a type of cable manufactured under patents issued to Richard S. Waring, founder of the company. Since this initial installation the company has expanded its business to include not only underground electric cable but a complete line of bare and insulated electrical conductors and cable accessories of all kinds.

A large cabinet occupied a prominent position in the center of the exhibit, containing samples of some of the early types of lead-covered cable dating back over 40 years. In contrast to these small, low-voltage cables of the early days, there were arranged on either side other cabinets containing samples of the most highly developed modern types of wires and cables, including rubber-insulated, varnished cloth and paper-insulated lead covered cables for light and power service, for operating voltages up to 132,000. Other samples were shown covering a wide range of insulated and braided wires and cables, copper and copperclad steel wire, etc.

Samples of unusually large lead-covered cables, steel tape armored cables and steel wire armored cables, the latter such as are used for submarine service, were also exhibited.

The display of cable accessories included cable terminals for outdoor and indoor use. Cable junction boxes constituted an interesting part of the exhibit; these consisting of types of boxes used in manholes where it is desired to sectionalize and interconnect underground cables.

Many of the company's products are its own original design, covered by patents, and are all produced in its own factories.

The expansion of its production capacity during its 45 years' existence was evidenced by a group photograph of four large, modern factories; these are located in Perth Amboy, N. J., Pittsburgh, Pa., St. Louis, Mo., and Emeryville, Cal.

The executive and general offices of the company are located in Pittsburgh, Pa.; branch sales offices are located in all principal cities of the United States. Through its export department, with headquarters at Pittsburgh, Pa., the company does a large export business through its connec-

OPPORTUNITIES!

Rates 8 cents per word, payable in advance. Minimum charge $1.50. Send cash with order.

"REBUILT" TELEPHONE APPARATUS

and exchange equipment saves you 30 to 50 per cent—quality and efficiency guaranteed.

EVERYTHING YOU NEED

for the installation and operation of a complete exchange—Magneto or Central Energy.

TWENTY YEARS' SUCCESSFUL OPERATION

of our "Rebuilt" Equipment Department puts it past the experimental stage. **Ask for our Free No. 78 Bargain Bulletin.**

ADDRESS

"Rebuilt" Equipment Department

Premier Electric Company

Chicago, Ill.

"REBUILT" when connected with PREMIER means something.

RECONSTRUCTED EQUIPMENT

Kellogg 16-33-50 or 66 cycle Harmonic ringers with gongs @	$1.25
Stromberg or Am. Elec. C. B. Booster Ckt. Induction Coils @	.35
Dean or Garford 800 ohm Peanut line relays @	.70
Cook 20 per strip No. 10 arresters @	9.50
Dean No. 5755 C. B. Straight line steel hotel sets @	5.00
Am. Elec. Straight line C. B. Wood hotel sets with booster Ind. Coil Talking Ckt. @	4.25
Western Elec. No. 2 self contained ball type combine line drop and jack @	1.50

Note: We just received in our stock Kellogg latest type cord Ckt. relays on mounting Strips. Kellogg 2 and 4-party latest type ringing keys, Kellogg Breast plate transmitters, Opr. Receivers, Dean No. 110 Multiple Jacks, Dean and Garford 10 and 20 per strip lamp jacks, 50 and 100 pair Coded flame proof Swbd. cable. Also cord Ckt. condensers, etc. Write for prices.

Write for our Bulletin

REBUILT ELECTRIC EQUIPMENT CO. Not Inc.
E. C. Stoeffhaas, Mgr.
1940 W. 21st Street CHICAGO, ILL.

FOR SALE

FOR SALE—Telephone Exchange—12 miles east of Tulsa—140 stations; growing community, ideal conveniences. Good shape; yearly revenue of $4.000.00. Priced to sell. Come and get it. Owasso Telo. Co., Owasso, Okla.

WANTED TO BUY

WANTED TO BUY—Exchange of from 400 to 800 stations. Address 6811, care of TELEPHONY.

The advertisers on this page will render you prompt, efficient service

Rebuilt Magneto Telephone Equipment

A limited number of the following rebuilt equipment in very fine condition.

Stromberg - Carlson, ball swivel, local battery desk stands only, complete with receiver, transmitter and new cord..... $4.00

Dean desk stands only, local battery, non-breakable, with induction coil, complete with receiver, Dean or Kellogg transmitter and new cord..... 4.00

Dean compacts, 3 or 4 bar gen., 1000 or 1600 ohm ringers 6.00

Stromberg-Carlson Desk Sets, with misc., good signal boxes, 3 or 4 bar gen., 1000 or 1600 ohm ringers 6.25

Dean desk sets, 3 or 4 bar gen., 1000 or 1600 ohm ringers 6.50

Write for our Latest Bulletin. It's free.

Electrical Instrument Repair Co.
1721 W. Adams Street Chicago, Ill

COMMON BATTERY DESK SETS

Kellogg No. 118 with F-404 and F-257 steel bell boxes	**$8.00**
Kellogg No. 118 with F-407 wooden bell boxes	**7.50**
Kellogg No. 97 with F-75 and F-259 steel bell boxes	**8.50**
Kellogg No. 97 with F-408 wooden bell boxes	**8.00**
Kellogg No. 39 with wood or steel bell boxes	**8.00**
S. C. No. 988 with No. 1131 steel bell boxes	**7.50**
W. E. No. 1020-B with wooden bell boxes	**7.50**
Dean Elec. Co. with steel or wooden bell boxes	**6.50**
Leich Elec. Co. with wooden bell boxes	**6.50**

BUCKEYE TELEPHONE and SUPPLY CO.
30 W. Spruce Street
COLUMBUS OHIO

WANTED

Get your Telephone Repair Work done at the old reliable Telephone Repair Shop
SUTTLE EQUIPMENT CO.,
Lawrenceville, Illinois.

We Pay Highest Prices at all times for Scrap Platinum, Discarded Platinum, Contact keys, relays, jacks, switchhooks, etc.

VERNON BROS. & CO.

Smelters Gold — Refiners Silver — Assayers Platinum

214 Stanwix St. Pittsburgh, Pa.

ANY MAKE telephones, switchboards, repaired, rewired, refinished, rebuilt, installed. Apparatus and supplies furnished. QUICK SERVICE. ALL WORK GUARANTEED. RATES REASONABLE. 17 YEARS' EXPERIENCE.
INDEPENDENT TELEPHONE REPAIR COMPANY
429 West Elm Street,
Salisbury, North Carolina.

FOR SALE

FOR SALE—If you want to purchase or sell a telephone property, write H. B Crandell, P. O. Box 226, Springfield, Ill

POSITIONS WANTED

POSITION WANTED—By man and wife with Mutual Telephone Co., where office and living quarters connect. Employed; reason for change, 18 years' experience. References. Address 6803, care of TELEPHONY.

POSITION WANTED—As superintendent of equipment, switchboardman or wire chief. Twenty years' experience all makes of equipment. Employed at present. Address 6807, care of TELEPHONY.

POSITION WANTED—By experienced telephone operator or supervisor. Widow, age 30, unincumbered, good health. References. Prefer Kansas or Missouri. State particulars. Address 6814, care of TELEPHONY.

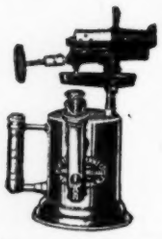
POSITION WANTED—Married man with fifteen years' experience, wants exchange to manage at once. Has owned exchange for last six years. J. H. Sauber, 2626 Madison St., N. E. Minneapolis, Minn.

POSITION WANTED—Combination man of proven ability desires permanent position. Reasonable salary. References. Go anywhere. English or Spanish is spoken. Lee Sprague, Chula Vista, Calif.

USED BY THREE GENERATIONS

and still the leading torches and furnaces:

"ALWAYS RELIABLE"



Covered by Patents
No. 79 Qt. No. 80 Pt.

Fifty years of experience mean —the most practical and most durable tools which are guaranteed to give satisfactory results. Experience is the best teacher. Buy **this** make which has a world-wide reputation.

Most jobbers stock. Others will order.

OTTO BERNZ CO. INC.
NEWARK, N. J.

Stocks in Newark, N. J., New York City, Chicago, and San Francisco

Offices in Newark, N. J., New York City, Chicago, Fort Worth, Denver, Helena, Mont., San Francisco, Los Angeles, Seattle, and St. Thomas, Ont.

Valuation—Supervision—Plant—Inductive Interference
Expert Administrative Council for Utilities

JAY G. MITCHELL
TELEPHONE ENGINEER
Member A. I. E. E.
Member W. S. E.
1411 South Park Ave. Springfield, Ill.

W. H. CRUMB
Telephone Engineer
9 South Clinton St. Chicago

TELEPHONE ACCOUNTING
"COFFEY SYSTEM"
The Independent Standard
Coffey System and Audit Co., C. P. A.
607 Peoples Bank Bldg. Indianapolis, Ind.
Exclusive Telephone Accountants

J. G. WRAY & CO.
Telephone Engineers

Specialists in Appraisals, Rate Surveys, Financial Investigations, Organization, and Operation of Telephone Companies.

J. G. Wray, Fellow A. I. E. E.
Cyrus G. Hill

1217 First National Bank Bldg., Chicago

tions in South America, Europe, Asia, and elsewhere throughout the entire world.

The Canadian market is supplied through its associated company, the Standard Underground Cable Co. of Canada, Ltd., Hamilton, Ontario.

Beginning with the World's Columbian Exposition at Chicago in 1893, the Standard Underground company has exhibited its products in eight of the largest expositions held throughout the world, and in each instance has received the highest award made for its class of product.

Stromberg-Carlson Takes Over Operation of Radio Station.

The Stromberg-Carlson Telephone Mfg. Co., of Rochester, N. Y., has purchased and will operate the radio station WHAM at Rochester.

The station, which is on the roof of the Eastman School of Music, has been operated jointly for five years by The Rochester Democrat & Chronicle and the Rochester Times-Union, the programs originating chiefly in the Eastman Theater and the School of Music.

W. Roy McCanne, president of the Stromberg-Carlson Co., said that the station equipment would be increased to 1,000-watt power and that the station would be affiliated with the National Broadcasting Co. It also is planned to expand the programs through cooperation with the Eastman School of Music.

These changes probably will not be made until next fall, the station continuing during the next few months on its present basis in the Schenectady-Syracuse-Buffalo chain.

Statistics of Guatemala Telegraph and Telephone Systems, 1925.

The telegraph and telephone systems of Guatemala are operated by the government as one unit. The combined systems, according to G. Otis Ogden, United States vice-consul, Guatemala City, reported a deficit of 13,477,666 pesos ($224,628) for the year 1925 (the latest figures available).

Total operating expense for the year was 24,739,046 pesos and total income was 11,261,380 pesos. Two hundred sixty-one telegraph offices were operating in the republic at the end of the year, five of which were inagurated in 1925. Eleven new central telephone stations were opened during the year, making a total of 87 in operation in the country. Total length of telegraph lines in use amounted to 6,871 kilometers.

All the national telephone lines in Guatemala had a combined length of more than 3,603 kilometers. At the end of 1925 there were 1,992 telephones in use in the republic, which represented an increase of 775 instruments since December 31, 1923. Work on the new automatic telephone system in the capital city has begun.

THE BOWDLE SYSTEM

Always shows you where you stand
We have solved the bookkeeping problem of a large number of companies.
Write us about our monthly audit
Bowdle Accounting Systems
Cerro Gordo, Illinois

DIRECTORIES
We publish your Directories FREE of CHARGE and pay you from 3 to 10 cents per name for your subscribers' list.
Also furnish stationery
WESTERN ADV. CO.
1284 GARFIELD AVE. TOPEKA, KAN.

J. K. JOHNSTON
TELEPHONE
JJK
ENGINEER
INDIANAPOLIS

During recent years I have been privileged to appraise Telephone Exchanges all over the United States. The list totals 520. Would you like to avail yourself of my services?
903-4 Lemcke Building

GUSTAV HIRSCH
Consulting Engineer
In all branches of Telephone Engineering, Rate Cases, Appraisals, Financial Investigations, Inspections and Reports
COLUMBUS - OHIO

Frank F. Fowle & Co.
Electrical and Mechanical ENGINEERS
Monadnock Building CHICAGO

CONSULTING
Telephone Engineer
GARRISON BABCOCK
1107 White Building
SEATTLE - WASHINGTON

W. C. POLK
CONSULTING TELEPHONE ENGINEER
Plans, Estimates and Reports, Appraisal and Supervision
Can arrange a moderate amount of financing
Telephone Building Kansas City, Mo.

NAUGLE POLES
Northern and Western Cedar
Butt-treated or Plain
NAUGLE POLE & TIE CO.
59 East Madison St., Chicago